The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Steam Heating for Machine Shops.

There are a number of shops requiring an improvement over the present method of steam heating, and the number where it is intended to put in steam-heating apparatus is so great that no apology is necessary for giving at great length a description of one of the most complete pieces of steam heating which has recently been put up. It was the last piece of work designed by the late Robert Briggs, and is an example of the latest and best practice. The work was specially designed for the Yale & Towne Mfg. Co., at Stamford, Conn. In a rough way the works may be described as forming a hollow square, with boiler-house, engine-room and some other buildings occupying the central portion of the court. The outside buildings are not continuous, a driveway at one corner separating one of the sides from the end, and a gap being left on a portion of the fourth side. This arrangement made it necessary to carry the steam by pipes radiating from a center in four different directions. Some of the buildings had steam pipes already in place, and no attempt was made to alter these, but merely to provide suitable connections. Many new buildings, however, were in process of erection at the time the specifications were made, and in these the pipes were disposed to the best advantage. The first idea was to heat entirely by live steam, but a little consideration showed that exhaust steam could also be used most successfully, and the final result was a combined system of heating, and in the rooms where exhaust steam is employed there is combined in the same room by the same apparatus the use of live steam heating also, the live and exhaust steam systems dividing about equally the heating surface between them. The temperature which it was desired to maintain was from 60° to 70° in the coldest weather. The heating surface of the combined system of half live and half exhaust steam-pipes was arranged in the ratio of 1 square foot to 150 cubic feet of space. Judicious allowance, however, was made for the exposure of walls and windows, and window surface in relation to the walls. In some of the rooms the windows are numerous and lofty, while in others they are small and at considerably greater intervals. This, of course, would make a difference in the ratios of the different rooms. As most of our readers know, great success has attended the overhead system of pipes in the Eastern mills, factories and machine shops—that is, the pipes have been arranged in horizontal coils at from 2 to 4 feet from the ceilings and from 1 to 5 feet away from the walls. The theory has been that the motion of the belts, pulleys and rapidly-running shafts sets up a decided circulation of air, and thus the hot air which rises is distributed throughout the rooms. It has been found that there is a decided advantage from having pipes overhead, because they are removed from under the benches, are in plain sight and are not liable to become receptacles for dust, waste and the rubbish usually thrown under or behind the benches. It has been urged as an objection that overhead pipes, if they once begin to leak, are the cause of great annoyance, dropping the water on the work and benches. This, we think, is a decided advantage in favor of the overhead pipes. A break beneath the bench is neglected indefinitely, nobody seeming to give it attention until the dripping of water and blowing off of steam become so great as to interfere with the working of the apparatus or to create a general disturbance. Overhead, any leak which may take place must of necessity be attended to at once, and on this account the overhead position may be considered highly advantageous.

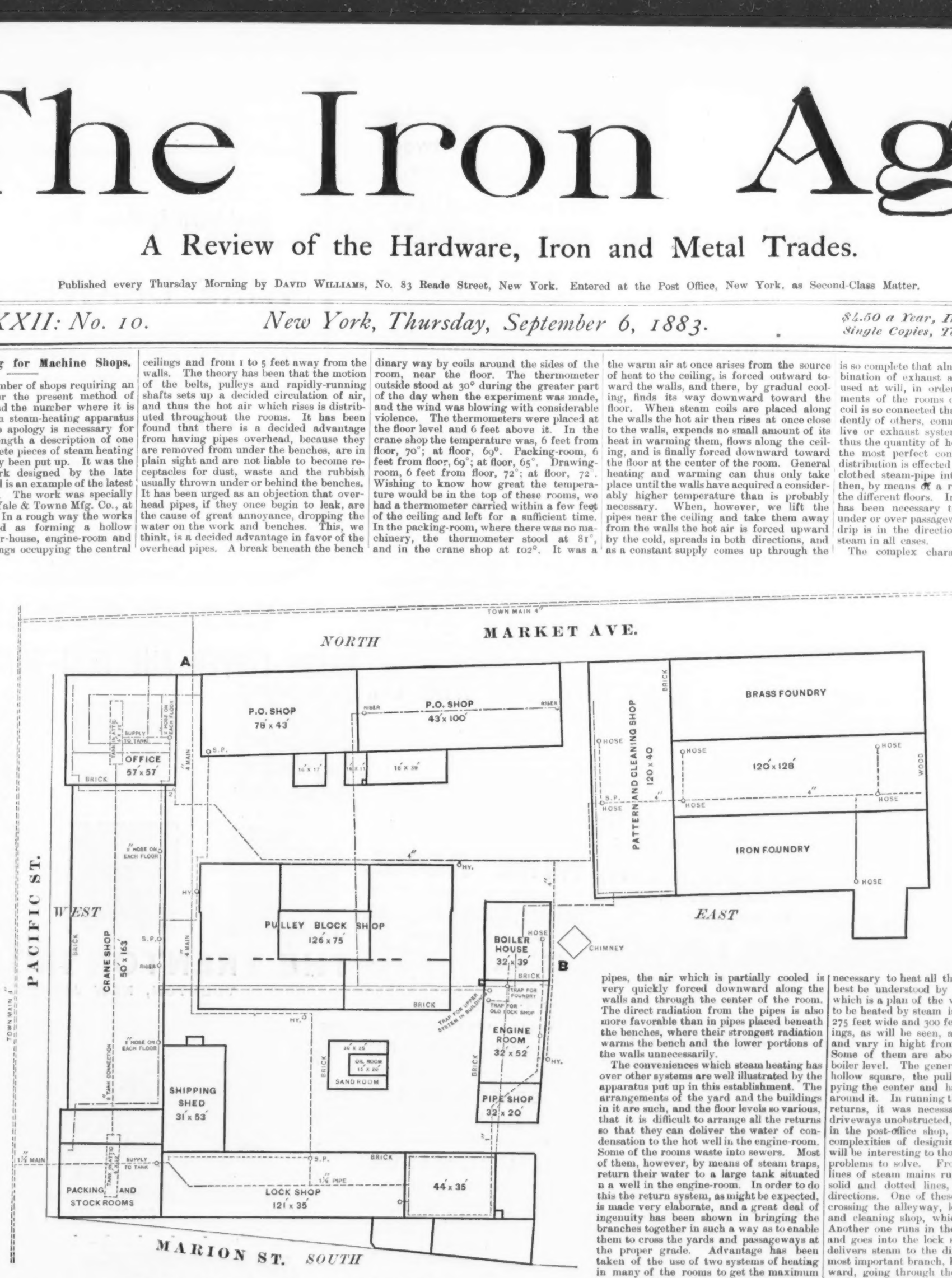


Fig. 1.—Plan of the Yale & Towne Mfg. Co.'s Works, Stamford, Conn.

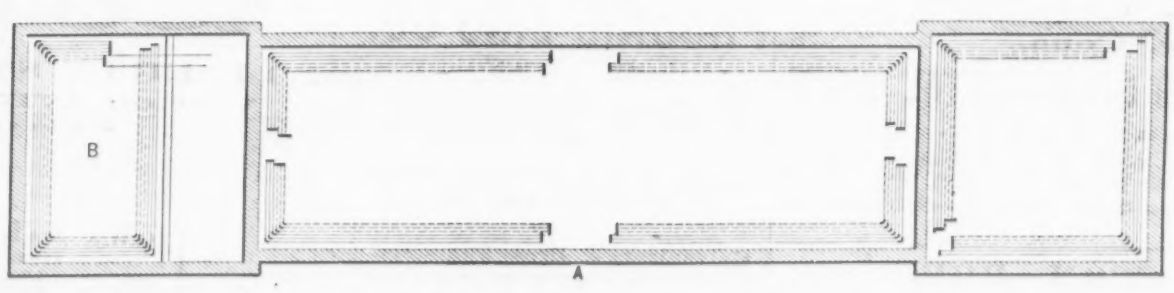


Fig. 2.—Plan of Piping, First Floor, West Front of Building.

STEAM HEATING FOR MANUFACTURING ESTABLISHMENTS.

At the Yale & Towne Co.'s works there are several rooms with no machinery in them which are heated by overhead pipes. The question at once arose whether these rooms were perfectly warm, and if so, how a heating system applied in this way could work at all. For the purpose of comparison, we had thermometers placed in the crane shop, a high room with machinery and having overhead pipes; in the packing-room, where there is no machinery, but a lofty room, heated in the same way, and also in the drawing-room, which was heated in the ordinary way by coils around the sides of the room, near the floor. The thermometer outside stood at 30° during the greater part of the day when the experiment was made, and the wind was blowing with considerable violence. The thermometers were placed at the floor level and 6 feet above it. In the crane shop the temperature was, 6 feet from floor, 70°; at floor, 69°. Packing-room, 6 feet from floor, 69°; at floor, 65°. Drawing-room, 6 feet from floor, 72°; at floor, 72°. Wishing to know how great the temperature would be in the top of these rooms, we had a thermometer carried within a few feet of the ceiling and left for a sufficient time. In the packing-room, where there was no machinery, the thermometer stood at 81°, and in the crane shop at 102°. It was a curious fact, for which we could find no ready means of accounting, that 2 feet up from the floor the thermometer stood at 68°, while it rose to 69° when laid on the floor itself. The difference in temperature in this room between the level of the workman's head and his feet was only 1°. In the packing-room it was 4°, but in this case we traced the result to an open door creating a draft across the room toward a window. This probably reduced the temperature 2° or 3° more than in other parts of the room, and it was in this draft that the thermometer happened to be hung. The experiment was sufficient to establish the fact that in these rooms the temperature is sensibly the same at the level of a person's head and also on the floor, and the question at once arises, How is it that a room heated from the top can be so nearly equal in temperature in all portions? The answer appears to be simple enough. No matter how a room is heated, the warm air at once arises from the source of heat to the ceiling, is forced outward toward the walls, and there, by gradual cooling, finds its way downward toward the floor. When steam coils are placed along the walls the hot air then rises at once close to the walls, expends no small amount of its heat in warming them, flows along the ceiling, and is finally forced downward toward the floor at the center of the room. General heating and warming can thus only take place until the walls have acquired a considerably higher temperature than is probably necessary. When, however, we lift the pipes near the ceiling and take them away from the walls the hot air is forced upward by the cold, spreads in both directions, and as a constant supply comes up through the pipes, the air which is partially cooled is very quickly forced downward along the walls and through the center of the room. The direct radiation from the pipes is also more favorable than in pipes placed beneath the benches, where their strongest radiation warms the bench and the lower portions of the walls unnecessarily.

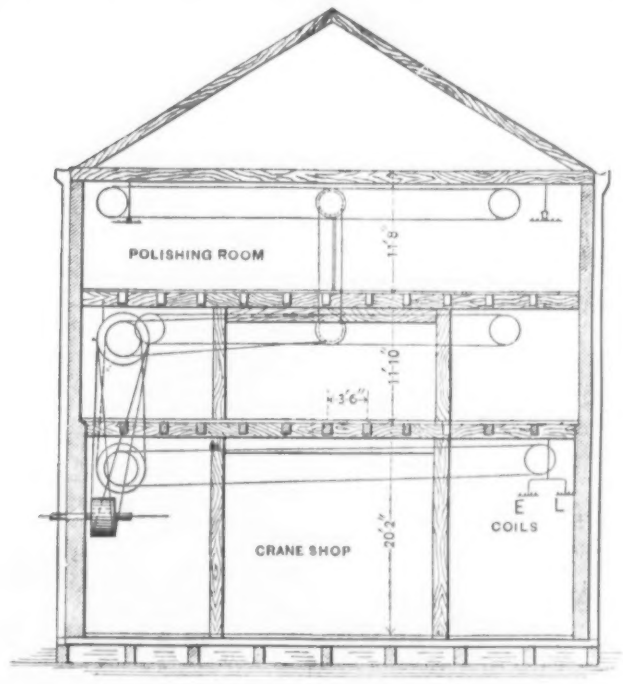
The conveniences which steam heating has over other systems are well illustrated by the apparatus put up in this establishment. The arrangements of the yard and the buildings in it are such, and the floor levels so various, that it is difficult to arrange all the returns so that they can deliver the water of condensation to the hot well in the engine-room. Some of the rooms waste into sewers. Most of them, however, by means of steam traps, return their water to a large tank situated n a well in the engine-room. In order to do this the return system, as might be expected, is made very elaborate, and a great deal of ingenuity has been shown in bringing the branches together in such a way as to enable them to cross the yards and passageways at the proper grade. Advantage has been taken of the use of two systems of heating in many of the rooms to get the maximum economy with the minimnm amount of steam. In case the exhaust steam is sufficient to do the warming for the whole building, cross connections are so arranged that live steam can be cut off everywhere and the exhaust steam turned into both live and exhaust steam coils, furnishing the heat for the whole room or all the rooms. In the morning, when it is necessary to heat up with great rapidity, especially in cold weather and before the engine is started, the connections are so arranged at the boiler-house that the watchman can turn on the live steam into the whole system of pipes indiscriminately, and bring up the heat rapidly; then, when the engine commences working, the live steam is cut off and the exhaust turned through the exhaust system. The principle on which the exhaust and live steam coils are arranged is very nicely shown in the little sketch, Fig. 2, from the specification, where the dotted lines represent the exhaust and the plain lines the live steam coils. In fact, the arrangement for cross connections is so complete that almost any desired combination of exhaust and live steam can be used at will, in order to suit the requirements of the rooms or the weather. Each coil is so connected that it can be, independently of others, connected with either the live or exhaust system of circulation, and thus the quantity of heat obtained is under the most perfect control. In general the distribution is effected by carrying one well-clothed steam-pipe into each building, and then, by means of a rising main, supplying the different floors. In one or two cases it has been necessary to cross doors and go under or over passageways. In the coils the drip is in the direction of the flow of the steam in all cases.

The complex character of the system necessary to heat all the establishment can best be understood by reference to Fig. 1 which is a plan of the works. The portion to be heated by steam is, roughly speaking, 275 feet wide and 300 feet long. The buildings, as will be seen, are of various sizes, and vary in hight from one to four stories. Some of them are above and some below boiler level. The general plan is that of a hollow square, the pulley-block shop occupying the center and having driveways all around it. In running the lines of mains and returns, it was necessary to leave these driveways unobstructed, and this, especially in the post-office shop, introduced several complexities of designing which we think will be interesting to those who have similar problems to solve. From the boiler-house lines of steam mains run, as shown by the solid and dotted lines, in three different directions. One of these starts north, and, crossing the alleyway, leads to the pattern and cleaning shop, which is 120 x 40 feet. Another one runs in the opposite direction and goes into the lock shop, where a riser delivers steam to the different floors. The most important branch, however, runs westward, going through the pulley-block shop to the crane shop. This one is branched and supplies the post-office shop. The packing-room, crane shop and office buildings, as well as the post-office shop, have several floors to be heated, and, as can be readily seen, the exhaust system would not by any means supply a sufficient quantity of steam, the engine only averaging from 150 to 160 horse-power in everyday work. Most of the buildings shown in our map return their water of condensation to the boiler. The old lock shop, the foundry, the post-office shop and the crane shop all have their drip returned to the boiler through traps. The post-office shop has its trap just at its outer wall. Most of the other traps are located in the engine-room close by the boiler. There are a few radiators in one of the buildings situated at some distance from the boiler, and in a location where the return would be expensive and difficult, which drip directly through a trap into the sewer. There are three lines of live-steam mains. The first of these, going to the lock shop, is a 2½-inch pipe. The second one is a 4-inch pipe, going toward the crane shop. From this a 2-inch branch is carried north to the post-office shop. Beyond this it is 3½ inches. The vertical main or riser in the crane shop is 4 inches, and is reduced to 3 inches at the top story. The horizontal branches in this building are 2 inches. The general dimensions of supply or return connections were obtained by the following rule: For each 100 square feet of heating surface in the coils or radiators the cross-sectional area became for the exhaust steam .24 square inch For live steam the area was .12, adding the same constant as before. For water of condensation for each 100 square feet of heating surface in coils or radiators the area was .06, adding the constant .25. This area was obtained and the size of pipe determined by comparing the results with manufacturers' dimensions of wrought-iron pipes, the nearest convenient size being used, taking, however, always a size larger rather

than a size smaller when there was a discrepancy between the computed area and the tables of sizes. Drips were put in wherever water was likely to accumulate, as at the bottoms of all the vertical mains and in other similar positions, and all the mains, whether for exhaust or live steam or flow from return mains, have been given a fall of at least half an inch in 10 feet, and the flow of the condensed water and the steam was made in the same direction.

Fig. 2 shows the general arrangement of the west front building, with the location of the coils and the relation of the live and exhaust steam circulation. This building, or set of buildings, has single live and exhaust steam mains, which enter at the point A. Risers here deliver the steam to each of the three floors. The method of general distribution is similar in principle on each one. The dotted lines may be taken to represent the exhaust-steam service, and the solid lines the live steam. The width of the coils, of course, is greatly exaggerated, in order to make the method of arrangement more distinct. The plan embraces four L-shaped exhaust coils and four L-shaped live-steam coils in each corner of the room or floor. In the two corner buildings the system is somewhat different. As at first intended, there were two L-shaped coils for exhaust and two for live steam in each of these buildings, but this plan has been modified, and in the packing-room B the system has been very greatly modified, and a single coil encircling the room has been introduced. In the crane shop the system has been carried out very completely, the coils being precisely as shown. Fig. 3, representing a section through the center of this shop, shows how they are located relative to the walls and ceilings. The live-steam coil, consisting of four pipes, is placed next the wall, and inside of that the exhaust coils are hung. The method of doing this is simply to carry the pipes on castings by means of gas-pipe connections. Both coils can be kept at the same level; they balance each other and the adjustment of fall is made very perfect. When, however, only six pipes are used in the coils, a single casting is employed for the purpose. This is supported from the floor beams in precisely the same way as before. Where, however, it is necessary to carry only four or five pipes, the device shown in Fig. 6 has been used. Sometimes this has been found convenient for a five-pipe coil, and in other cases been used for four-pipe coils. It can also be used for coils of two pipes each, one for the exhaust and one for the live steam, as has been found convenient in some situations. In this case the suspension has been by a rod and bolt, the adjustment being obtained by screwing up the nuts underneath.

In the office building the system is decidedly mixed, some of the floors being heated by radiators, others being heated by stacks of pipes along the walls near the floor, and we believe one of the top rooms has horizontal coils near the ceiling. In this building the system of cross connections has been carried out completely. The different coils taking steam at A on each floor have a complete system of stop-valves, so that live steam can be put into any exhaust coil, and in this way, when the exhaust and live steam are insufficient, they can be reinforced by turning live steam into the exhaust coils, or both coils can be used for the exhaust steam whenever it is desirable. In doing this it is particularly necessary to make the



Steam Heating for Machine Shops.—Fig. 3.—Sectional Elevation, West Front of Building.

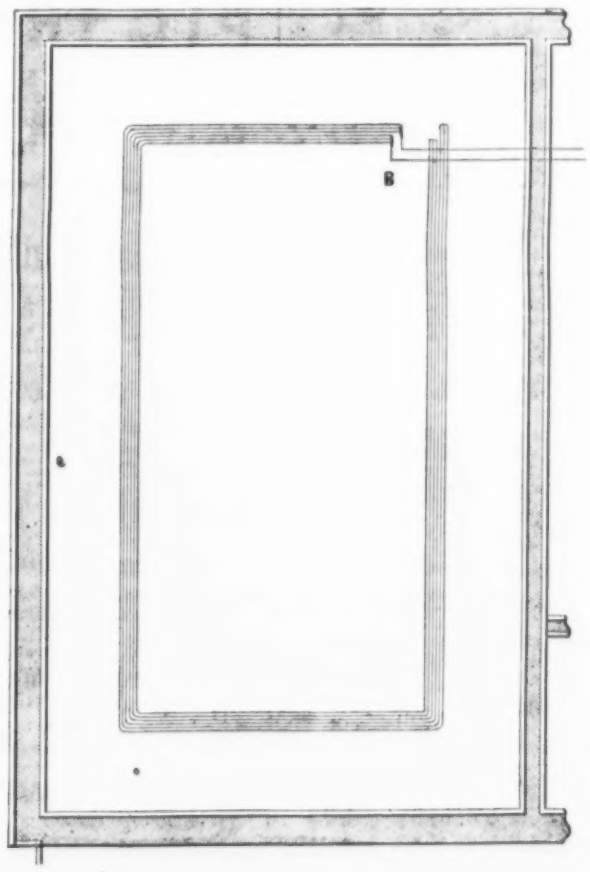


Fig. 4.—Stock and Packing Room Pipes.

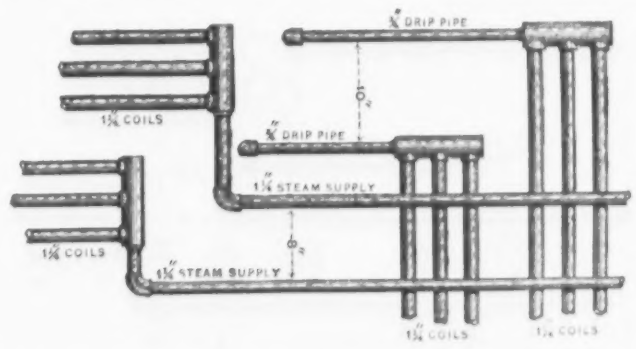


Fig. 5.—Plan of Connection at B, Stock and Packing Rooms, See Fig. 4.

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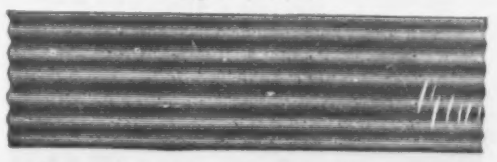

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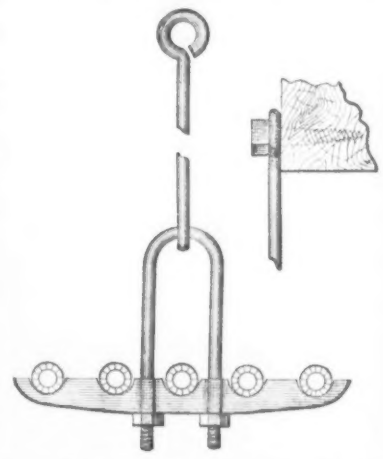
connections in such a way that expansion and contraction shall have no disturbing effect on the joints. In this connection the reader must not overlook the advantages which the form of the coils and the method of hanging give for allowing the most perfect freedom for expansion and contraction, both individually and collectively, of the pipes and the coils. The whole system is exceedingly elastic in every direction, and though some of the coils are of unusual length, yet no difficulty has been experienced from this cause. In this building the work has been comparatively simple and straight away, differing, excepting the packing-room, very little from the general scheme applicable throughout the buildings. In the



Steam Heating for Machine Shops.—Fig. 6.—Hanger Supports.

packing-room, which is very large, lofty and unobstructed, the plan, of course, was easily modified. The position of the coils in most of the rooms in this building was such that the arrangement for reaching the various valves could be easily made without changing in any way the arrangement.

In other portions of this work, as, for example, the post-office shop on the north side, the case was somewhat different, and the system of piping adopted is an exceedingly good illustration of the ease with which the steam-heating system can be modified to suit almost any conditions that may arise. This we shall describe at length in a future issue.

(To be continued.)

Screw Threads in Cast Iron.

The following article on screw threads in cast iron is from the pen of Mr. P. Barnes. It contains some points that are worth thinking of:

Many rolling-mill men have long refused, as a fixed rule of practice, to employ for any purpose a screw-thread cut or tapped in cast iron, unless the screw can be very large, comparatively, in diameter, and can hence be made with a coarse pitch of thread. This determination is unquestionably a wise one, and is in the direction of the practice of many judicious men in other lines of machine-building, although the requirements of rolling-mill service are in many respects more severe than almost any other. Even if all the obvious exceptions to this rule or custom be allowed, there are still reasons enough, and forcible ones, too, why the custom should be more nearly universal in machine work than it now is, in the details concerning which all builders would agree. It is probable that no one thing has done more to warrant builders in clinging to the use of tap-bolts and all similar screw-thread details in cast iron than the growing use of the Sellers thread with the flat top and bottom, although even this advance in screw-cutting is far from being universally adopted, especially among the smaller shops in which, in many localities, so large a proportion of the whole product of general machinery is made. Even with the older sharp-angle threads it has been, and still is, an unwritten law that for tapping into cast iron the hole shall be drilled decidedly larger than is really due to the diameter at the base or root of the thread, so that, in effect, the more modern result, so desirable and important, has been obtained—that is, the thread with a flat top in the hole when tapped.

One reason why it is needful to use even a flatter-topped thread in a hole tapped in cast iron than would be required in a wrought-iron nut, is the tendency of the tap, if not skillfully handled and kept properly oiled, to drag the thread out with it if the attempt is made to cut a thread of full depth—one that shall fill the threads of the tap full, clear to the bottom of each space between them. If the hole be drilled so as to correspond to the diameter of the root of a very flat-bottomed thread, this dragging or tearing tendency is almost wholly relieved, and a perfect and strong thread remains. The most troublesome cases in which holes tapped with cast iron are likely to be used are plainly those in which the tap bolts must frequently be backed out, as in taking off the bonnet of a steam chest or of a globe valve, or the cap of a pillow-block, and the number of these is simply legion in which the bolts have been twisted off, or the thread dragged out of the cast-iron body or flange, simply because some one in the first instance failed either to make the bolt big enough to give the needful body of iron in the thread, or had, perhaps, fitted the bolt too loosely, or had suffered the threads to become slightly crossed in putting the parts together.

In many cases the simple widening of flanges, adding thus a very few cents' worth of iron to the cost of the valve or other piece of work, would have removed the slightest pretext for the use of tap-bolts, or standing bolts of any kind, the wider parts or flanges permitting the holes to be drilled directly through both the body of the work and the bonnet, or similar part, which is to be bolted on. So many cases can be found in which the addition of 20 cents' worth of iron would have added in a very important degree to the strength and certainty of the durability of the whole, that it is hard to believe that the makers of the work in question could have ever given any time at all to the true

A. H. McNEAL,

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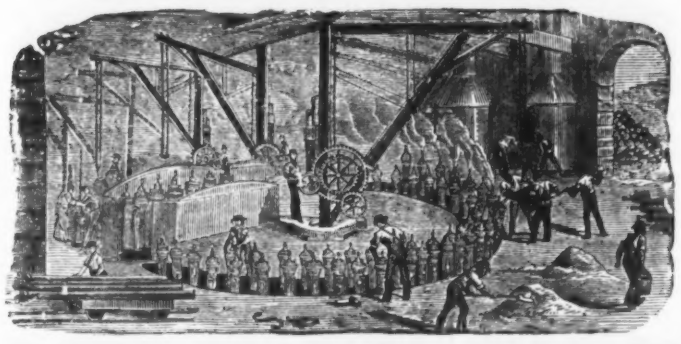

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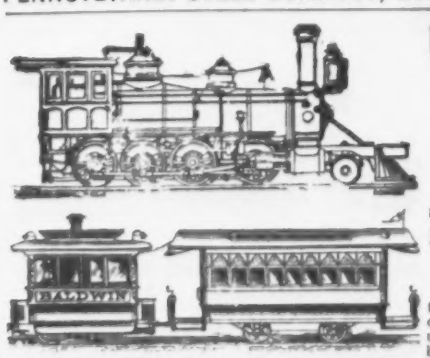

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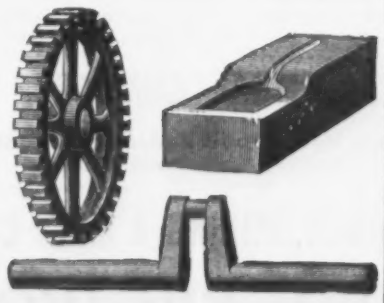

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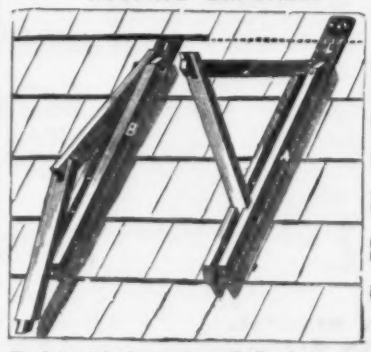

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study of their own goods in such particulars. It is obviously a cheaper thing to drill the holes directly through the two flanges, when clamped securely together for the purpose, than to drill each one part way through with one drill, and then to handle the whole a second time to finish the holes with another and smaller drill to suit the tap required. So, too, it is a less costly thing to buy or make a plain bolt and nut, each properly suited to the other, than to fit a tap-bolt and to screw it into place, square and true to the bearing surface upon which the head must rest. The common bolt and nut have this important advantage, too—that a much greater looseness of fit may properly be tolerated in them, one upon the other, than could be allowed in the use of a bolt tapped with the cast-iron face. Indeed, the looseness which in most cases ought to be allowed between the bolt and nut would be fatal to even a short life of a safely-fitted joint of this character.

Some men object to joints made with flanges and with through bolts for the reason that they are supposed to be clumsy and ill-proportioned, but the gospel of clumsiness may well be preached to some of the current builders of machinery supposed to be "constructed for heavy, continuous service." The shocks of rolling-mill work, and of some other similar lines of duty to which machinery must be applied, are not in the slightest degree respecters of persons, or of any known thing except the most massive outlines and dimensions in the parts exposed, and, indeed, these very qualities are sometimes dealt with as utter trifles when wrecking emergencies and stresses are developed in the machinery.

Early Railroading in Kentucky.

A correspondent of the Quincy (Ill.) *Whig* writes as follows of the first railroad in Kentucky, later part of the Louisville, Cincinnati and Lexington road, now owned by the Louisville and Nashville:

The recent railway exposition at Chicago recalls to the mind of the writer that he witnessed when a boy the construction of one of the first railroads in the world. It was in the state of Kentucky, from Lexington to Frankfort, and was completed in 1838 or 1839. You may be sure it was quite a primitive affair compared with railroads of the present day. I shall attempt, to the best of my recollection, to give a description of it. A railroad had been built in England, and had excited the wonder of the world, on account of its great speed and capacity for hauling over its track numbers of cars at a time, containing tons of freight. The wonder and excitement produced by this new and novel mode of conveyance penetrated into the interior of Old Kentucky to Lexington, the home of the great and renowned Henry Clay, the acknowledged leader of the old Whig party, and an agent was sent over to England to see and examine carefully this new and powerful device for moving the freights of the world on land, with a view of using the knowledge obtained in constructing a similar road in our "Old Kentucky home." The agent in due time returned, and described with enthusiasm all he had seen and experienced of the new wonder. The people of Lexington were not only wealthy and intelligent, but enterprising, and ambitious to surpass both Louisville and Cincinnati. Located as Lexington is, almost in the center of the State, with no navigable stream near enough to be of any advantage—Frankfort being about the nearest available point to the Kentucky River—her citizens at once determined to build a railroad to Frankfort. I do not remember much about the initiatory steps that were taken for right of way, &c., but I recall the fact of the grading of the road, and the deep interest manifested by everybody in its construction. The agent who had visited England found the rails laid upon ties, about the same as now, but our Lexington engineers thought that wood was too temporary and destructible, so they adopted limestone sills 10, 15 and 18 feet long, laid down longitudinally, with ties under them crosswise every 4 or 5 feet. The rails were flat iron bars 2½ inches wide, fastened with bolts to the stone sills by drilling holes and filling in around the bolts with molten sulphur or melted lead. Only passenger cars were used at first, and they were drawn by two horses. It took about three hours to make the run down to Frankfort, 28 miles.

The cars were two stories high and very curious-looking affairs; the lower story was inclosed and set apart for the use of ladies and children, while the upper story, being open, was generally occupied by men. But in warm weather many ladies preferred to ride up stairs, as they called the top story. The first winter played the mischief with the stone sills, the frost cracking and breaking to pieces many of them, so they were all taken up and replaced with wooden sills. Many of the stone sills can still be seen lying alongside the track in places. The road is very crooked, because the engineers who surveyed it were averse to crossing streams on bridges, so they went around the streams, alleging that it was an advantage to have the road crooked, so the conductor could look back and see that his train was all right. Between Lexington and Midway are two very deep cuts through the solid limestone, which would now be tunneled. Some years afterward it was discovered that there were no tunnels on the road, as in England. A proposition was made to cover these deep cuts over and thus convert them into tunnels; but as there was no spare dirt on top, the expense of getting it up was thought to be too great, so the tunnel project was abandoned as not really essential to the running of the road. After a time a locomotive or steam car, as it was then called, was put on the road. This was a small and even more curious-looking affair than the passenger cars. It had no cab and no such tender as at present. The tender was a sort of flat car, with room for wood and a hogshead of water, which was filled by pumping water from a well on the side of the track. The engineer and fireman were exposed to the weather, having no shelter whatever. The engine was a great curiosity, and was admired all along the line with the greatest interest, wonder and awe by the people of every class—more especially the black slaves, who regarded it as the work of the devil. There was no pilot or cowcatcher, but in lieu thereof there were two large square beams projecting out in front on each side of the base of the boiler, to which were attached two large hickory brooms, which swept the track and kept it clear of any ordinary obstruction. The grade for about a mile below Lexington was quite steep, the train always coming up it rather slow, and the boys would go down and jump upon those projecting beams and ride up in town on the steam car. This was thought to be a great feat until a colored boy slipped off, and, falling under the driver, was decapitated, after which the boys were deprived of their free ride on the rail. Soon after the locomotive was placed upon the track there was an excursion given from Lexington to Frankfort on flat cars fitted up for the occasion by the railway company. When the train got near Frankfort it began to snow, the engine was immediately run under shelter to keep it from being injured, and the engineer positively refused to run it in the snow, fearing it might run off the slick track and get smashed up. The snow continuing to fall, many of the excursionists footed it back home. Such was railroading in "ye olden time." Frankfort being located in a deep valley—or, rather, hollow—on the Kentucky River, the cars were let down the steep grade by means of a rope wound round a drum or windlass, worked by a stationary steam engine on the top of the hill.

Movable Houses.

"Movable structures" says the *Lumberman's Gazette,* "or 'shakedowns,' as they are sometimes called—buildings for temporary occupation, which can be erected and taken down and removed at will—are becoming a very important article of manufacture. They have been constructed in every conceivable form, and of all sorts of material, but the demand for them was probably never greater than at present. Some Canadian firms have been doing an extensive business for some time in the manufacture of wooden structures which are intended as permanent buildings, but which retain the advantage of being easily removable whenever desirable, in a very short time, with comparatively a trifling amount of trouble and expense. The London (Ont.) *Advertiser,* in alluding to an establishment at Walkerton which engages quite extensively in the manufacture of these residences, says: 'At Messrs. Truax's planing mills orders for a whole row of houses can be filled in a few days, and it is not uncommon to see an entire street for Brandon, or a block for Winnipeg, sent out on a train 20 or 30 days after the order has been received. During the past season Messrs. Truax shipped 219 cars of knock-down house material to the Northwest.' These buildings were the result of necessity during the war, when they were first brought out for use by the sutlers of the army, and many a one has suffered demolition at the hands of soldiers because of the extortions and rascality of the owners. Their use in the army suggested their utility in the prairie country of the Northwest, where timber is scarce, and their practicability has become recognized to such an extent that the demand has become quite excessive. Notwithstanding their recognized utility and adaptability, the disadvantage of weight has overshadowed them, making them, comparatively speaking, quite expensive when they reach their destination. But as necessity brought them to the surface, so in time will it bring their successor if it shall prove inadequate for all the demands, including cheapness, utility, inexpensive transportation, durability and comfort.

"We perceive that an officer in the German army has invented a new form of transportable dwellings, which seem to combine some of the qualities in which the wooden structures are lacking, especially lightness, and that other advantage of compactness when prepared for transportation, which are essential at least for bivouacs and the march. These new aspirants for popularity are made of felt, impregnated with substances which render them impervious to water. The idea is intended to apply specially to hospital tents and the large kind of such dwellings. In addition to being water-tight, these tents are cool in hot weather, and, to some extent, are able to moderate a severely cold temperature. They can be packed into a few comparatively small boxes, and ventilation is duly provided for. They resist hurricanes better than linen tents. Their erection and removal is very simple, and their cost is said to be small in comparison with that of linen tents. If they shall possess all the qualities which are claimed for them, the days of the wooden 'shake-down' may be set down as numbered, as soon as the merits of the new felt houses become fully understood."

When Alexander Graham Bell was asked to say something about the recent decision of the Examiner of Interferences, says an exchange, he laughed and said he had just received it in 200 printed pages, and had not had time to read it. He said generally that he was glad to see the beginning of the end of the telephone litigation. In conversation he said he was still pursuing his investigation in regard to electricity, reading and experimenting almost constantly. Incidentally he was preparing a catalogue of books, pamphlets and even short articles on the subject, with a view to facilitate his own investigation and those of others. He had the titles of 40,0000 such productions already. He did not begrudge the hard work involved. Knowledge of what has been done or said in this field would help every electrician very materially. After days of experiment, he sometimes—in fact, often—found that a discovery which seemed absolutely new was only new to him. Professor Bell predicts a great future for the telephone. It has been hindered by the opposition of the telegraph companies. Abroad it has been very generally adopted by the telegraph companies, especially on branch lines in the cities and at small offices in the country. In this way they can get along without telegraph operators at many of the offices whose receipts would not support operators, and they would not be so crippled in case of a strike as are our telegraph companies to-day. Still, there

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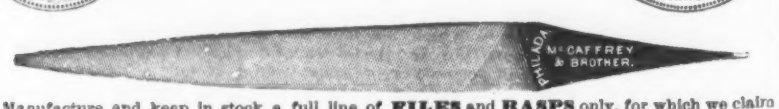

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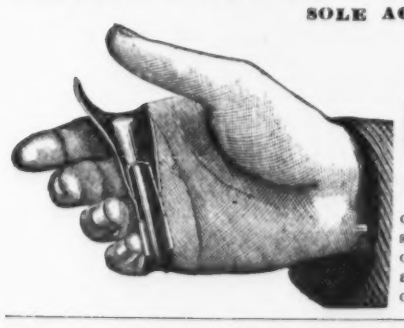

All Metal Adjustable Corn Husker. Made entirely of Brass, without leather straps, loose rings, web or set screws to wear out and render it useless. Only one size which is of importance to the trade, as there are no odd sizes that are unsalable. Send a sample order. Packed one-fourth gross in a box.

(This Advertisement Changed Weekly.)

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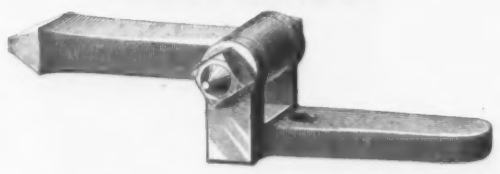
Largest Variety of Carriage Forgings made by any House.



1¼-inch, for Heavy Wagons - - - - List per doz. prs. $12.00.

Send for our new Price List of Wagon Hardware.

SEND FOR DISCOUNTS.

Every other variety of Shaft Coupling furnished.

THE E. D. CLAPP MFG. CO., - Auburn, N. Y

LINING NAILS & BUTTONS.

Swedes Iron Upholsters' Gimp, Lace and Card Tacks, Black and Tinned Trunk and Clout Nails, Finishing Nails and Brads; Shoe Nails of Swedes and Common Iron; Copper, Brass and Steel Lining and Saddle Nails; Tufting Nails and Tufting Buttons; Brass and Iron Wire Nails, Molding Nails, Escutcheon Pins, Black and Galvanized Regular and Chisel-Pointed Boat Nails.

New York Salesroom, 116 Chambers Street.

AMERICAN TACK CO., Fairhaven, Mass.

Nicholson FILES.

Bandsaw Files,
Boot Heel,
Brass,
Cabinet,
Cant,
Cotter Taper,
Cotter Equaling,
Cross or Crossing,
Doctor,
Drill,
Feather Edge,
Finishing,
Flat,
Flat Equaling,
Flat Wood,
Gang-Edger,
Ginsaw,
Gulleting,
Half-Round,
Half Round Wood,
Hand,
Hand Equaling,
Handsaw Blunt,
Handsaw (Double-Ender),
Handsaw Taper, single-cut,
Handsaw Taper, double-cut,
Handsaw Taper, slim,
High Back,
Hook-Tooth,
Knife,
Knife Blunt,
Lead Float,
Lightning,
Machine Mill,
Mill,
Mill Blunt,
Mill Pointing,
Pillar,
Pitsaw,
Reaper,
Roller,
Round,
Round Blunt,
Slotting,
Slim Handsaw Taper,
Square,
Square Blunt,
Square Equaling Files,
Stave Saw,
Three-Square Files,
Three-Square Blunt Files,
Tumbler Files,
Union Cut,
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RASPS.

Baker's,
Beveled Edge,
Bread,
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File, Flat and Half-Round,
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Flat Wood,
Half-Round Shoe,
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Horse Mouth,
Jig,
Oval or French Shoe,
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SPECIALTIES.

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Bent Rifflers, Handled,
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PROVIDENCE, R. I.,

SOLE MANUFACTURERS.

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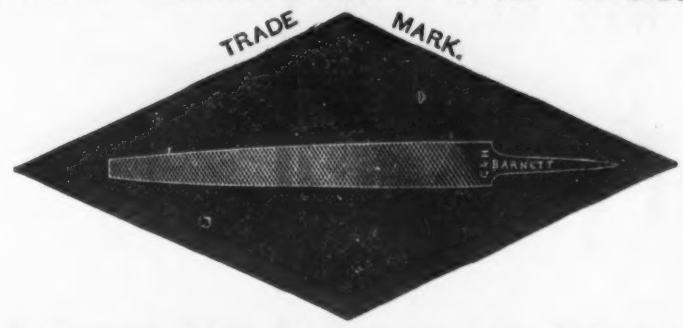

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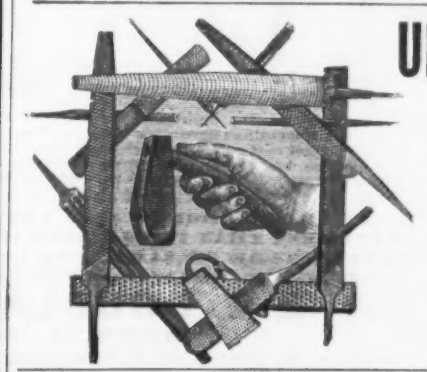
Warranted CAST STEEL. 187 Tenth Street, Williamsburgh, New York.

All descriptions of Files made to order. Price List mailed on application. Established 1863.



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FILES AND RASPS

Made from the Best Refined Cast Steel.

With all the requisite facilities to produce a first-class article, we are enabled to offer Files that will give entire satisfaction.

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THRIFT FILE WORKS,

Manufacturers of all kinds of

Files, Rasps.

CHRISTIAN HENSSLER, 426, 430, 432 & 434 Ireland St., PHILADELPHIA, PA.

Unexcelled in quality. Full weight and size.

HAND-CUT **FILES** Established 1856

JOHNSON & BRO.

No. 1 Commercial Street, Newark, N. J.

The Patent Combined

Dinner Pail and Lantern.

The most perfect Dinner Pail in the world. Hot coffee for dinner and a Lantern at night.

Manufactured by JOS. HAIGHT, Port Chester, N. Y.

Sent by express on receipt of $1.00. Agents wanted.

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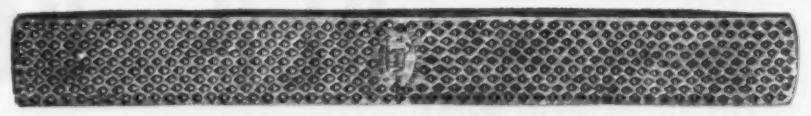
Repairs for Stoves made at Troy, Albany, Rochester, Cleveland, Buffalo, Boston, St. Louis, Quincy, Chicago, Milwaukee and elsewhere, at W. C. METZNER, 127 W. Randolph St., Chicago, Ill.

HELLER & BROS., Newark, N. J.,

Manufacturers of the

Celebrated American

HORSE RASPS AND FILES,



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"WIRE CUTTER AND PLIER COMBINED."

Specially Adapted for Use on Wire Fence.

Also Manufacturers of

Blacksmith and Machinists' Stocks and Dies, Plug and Taper Taps Hand, Nut and Screw Taps, Pipe Taps and Reamers.

Price List on application. Established by DANIEL B KING, 1820

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For Coaches, Phaetons, Buggies, Wagons, &c.

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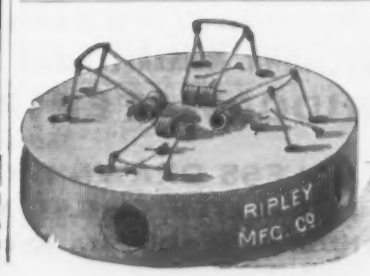

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For Home & Export Trade.

RIPLEY MFG. CO.,

Unionville, Ct., U. S. A.,

Manufacturers of

Porcelain-Lined Lemon Squeezers, Mallets, Rosewood Faucets, Patent Boot Jacks and Hardware. Fine Wood Turning a Specialty.

are more than 500,000 telephones in use in the United States to-day, and the manufacturers cannot supply the demand.

Railway Exhibition at Chicago.

In the last number of the *Journal* of the Franklin Institute, E. Alexander Scott has the following report on the Railway Exposition at Chicago. It is, in the main, a very good one, and the suggestions made are well worth careful consideration. Without doubt, Philadelphia knows how to conduct a great exhibition. She is, by location and local habits, the best city for this purpose in this country, perhaps the best in the world, and we believe that before many years have passed a great railway exhibition will undoubtedly be organized, and Philadelphia is certainly the city, of all others, in which it should be held. Mr. Scott's report is as follows:

At the last stated meeting, the Institute kindly passed a resolution accrediting me as its representative to the National Exhibition of Railway Appliances, now being held at Chicago, with the special duty of looking after the electrical exhibits, and I purpose now to give you a very brief report of my observations. First, then, the exhibition is a success, as such, but financially it is not likely to profit its projectors. This is due to the fact that it did not secure the hearty support of the local press. As is usual with exhibitions, everything was in a very incomplete state on opening day, and there was the usual struggle for space by late exhibitors. On my first visit to the building, I called upon the secretary and directors, and learned from them that the greater part of the work and responsibility had fallen upon two or three gentlemen, and that the burden was much too heavy. This would account for much of the confusion in the installation, which appeared as late as the second week of the exhibition. I found it impossible to get even a list of the electrical exhibits, much less learn where they were located, and I therefore hunted them up, and am not yet certain that I saw them all.

Confining myself, then, entirely to electrical apparatus, and passing by the many large displays of machine tools, forgings, &c., made by Philadelphia manufacturers, I would classify the electro-magnetic apparatus on exhibition under the heads of railway signals, magnetic brakes, electric lights, electromotors, and general electrical supplies. As the Franklin Institute is now preparing for an electrical exhibition, it might be well to consider early a question which has bothered the managers of the Chicago exhibition, and that is, What to admit and what to reject. One of the first remarks made by a visitor on entering the building is that there are many things there which do not seem to have any connection with railroads, such as type-writers, paper hangings, &c. One exhibitor complained that he was not allowed to exhibit envelopes, because, he said, they were largely used by railroad companies. The secretary, however, told him that they had concluded to draw the line at envelopes.

At first glance it might seem that it would be difficult to secure for an electrical exhibition a sufficient variety of articles to make a respectable show, but electricity has within a few years invaded so many fields hitherto occupied by other agencies that, before another year is upon us, it may be necessary to draw the line closely and exclude much that would occupy space to the detriment of more appropriate articles. The experience at Chicago shows what has often been demonstrated in this city—that the interest is largely increased by showing everything in motion that is made to move. Instruments should be so shown as to demonstrate at a glance what they are made for; otherwise, it may be difficult to make such an exhibition as the Franklin Institute Exhibition of 1884 a popular one. An electric motor which does not move tells no tale except to the expert, and a Leclanché cell so placed that its use is not apparent, might as well be a jar of pickles.

To return to the exhibits, my attention was first called to the various systems of automatic electric railway signals, of which I made a special study. Only two of these appear to have been well digested, and I may here remark that it is surprising how many inventors cudgel their brains to get up apparatus which is of no earthly use, because they have not duly considered the conditions under which the appliances must be used. Automatic signals, to be of any value, must cover every possible case; must provide for every position of trains; but the majority of those exhibited seem to have been gotten up with the idea that the only danger to be guarded against was that a train might be overtaken by a following train or run into an open draw. Unless provision is made for every case which could by any possibility arise, there is no likelihood of any automatic system being adopted on any well-regulated railroad. This is only another illustration that the best inventions originate with the workmen and spring from the necessities of the case.

There are two general systems, one of which uses the railroad track for the electric circuit, and the other uses wires, either carried on poles or in cables. The Union Switch and Signal Company of Pittsburgh, exemplifies the first, and the Hall Railway Signal Company, of Meriden, Conn., the second system, and each seems to have fairly compassed the problem of automatic signaling. Both are in practical operation on railroads in this country. Messrs. Crandell & Strohm, of this city, exhibit an automatic block system in operation which does not throw up visible signals, but which is intended to operate by shutting off the steam and putting on the air-brakes whenever the train enters a block which is not clear. Other systems are exhibited which aim to accomplish the same result. The perfection of the Westinghouse air-brake would seem to close the field against any brake operated by a different method. The use of this brake, however, has hitherto been confined to passenger trains or short stock trains. This leaves a field for a good magnetic brake for freight trains, and two very creditable brakes of this character were shown. Both are actuated by a dynamo upon the locomotive, and one supplements this by a storage battery in each car to operate the brakes when the car is separated from the locomotive. There are several practical objections to these brakes in their present state of development, but a thoroughly good magnetic brake may yet be perfected.

The electric light was represented by five different systems of arc and incandescence lights. We are all now so familiar with the arc light that I may simply say that they were all very good and all claimed to be the best. I may say, however, that one system had many admirers, and its lights, which were scattered plentifully through the whole space, were complimented for their beauty and steadiness. The inventors of that system are our honored associates, Messrs. Thompson & Houston. The incandescence lights of the Maxim, Edison and Swan systems were in endless profusion and much admired. Electric motors did not show up very well. The only style was the Weston dynamo, used as a motor on the Field & Edison Electric Railway, and in another place to operate a centrifugal pump for a waterfall. Prof. Sylvanus Thompson says there is a great field for electric transmission of power, but if the inventions thus far made public are the best that our inventors have developed, we have not yet climbed the fence. So far as the public are concerned, the electric railway is a success; the people stand in line for a chance to ride on it. But at what expense of power are the motor and loaded car, weighing in all, perhaps, four tons, propelled? On investigation I found that an 18-horse-power engine was not equal to the task of moving the train, and the gates were shut against the public until the wires were connected with a 40-light dynamo, run by a much more powerful engine. In like manner the dynamo which operated the pump was a five or six light machine run by a 40-light dynamo.

The improvements in dynamos are chiefly in the new regulators for reducing the power to correspond with the reduction in work performed. The storage battery made no show and seems to have been withdrawn from the public for a time. In conclusion, I would say that although the display at Chicago is a fine one and well worth a visit, I think we do these things better in Philadelphia, and the Franklin Institute, with its long experience and excellent organization, will have no trouble in arranging an exhibition more extensive, more attractive, and much more valuable in its results.

Boiler Setting.

The *Locomotive*, which, by the way, is full of little practical sermons on matters connected with boilers and their uses, has the following item in regard to a dangerous form of boiler setting often encountered, and often, no doubt, the cause of those mysterious explosions about which so much breath and valuable time are wasted:

In setting a horizontal tubular boiler, the brickwork of the furnace is so adjusted as to expose nearly or quite one-half of the exterior surface of the boiler to the direct action of the heat, but care is taken to close in the brick sides of the setting at a point below which the water never falls except through carelessness and neglect. It will be readily seen that if the fire and direct heat from the furnace is allowed to come in contact with portions of the boiler that are not protected by the water within, there will be danger of burning the iron and destroying its strength. We call attention to this danger from the fact that we have found boilers so set that the fire line is above the water line of the boiler, and a strip of varying width, extending the whole length of the boiler, is exposed to the action of the fire without the protection of water within. The evident object of this plan of setting is to get as much heating surface as possible, so as to secure great evaporative efficiency. But in the effort to secure this efficiency safety is forgotten. It should be borne in mind that "efficiency" at the expense of safety is not economy, and while a boiler may apparently do unusually good service at first by some such plan, it may prove very expensive in the end in repairs, and in greatly shortening the working age of the boiler. Any device that ignores sound principles is dangerous, and the effort to gain an advantage by such practices, where the party doing them is intelligent enough to know the danger, is inexcusable. It is introducing an element of trickery that should not for a moment be tolerated. A person setting a boiler may be ignorant of the danger of bringing the fires of the furnace in direct contact with unprotected iron, but with a full knowledge of the danger, there is no excuse.

It is considered highly probable that the discovery of the cementation process for making steel had its origin in Liège, Belgium. At the commencement of the 17th century, in 1613, a permission to convert iron into steel is found to have been officially accorded to two armorers of Maestricht, a town which then belonged to the Province of Liège. Judging from this, the metallurgist, Karsten, was probably correct in saying that "England, which has now become the school of iron metallurgy, owes to the Continent two great discoveries—namely, that of the blast furnace and that of cementing steel."

The Brooks Underground Conduit Company, of Philadelphia, have completed arrangements for a trial of their system of laying electric wires underground. Preliminary tests made up to the present time have given very satisfactory results, and it is confidently expected that subsequent trials will fully meet all expectations. Reports from Chicago are also to the effect that a similar step has been taken in that city by the Postal Telegraph Company. Speaking of the results of the enterprise, a gentleman prominently connected with the company stated that they proved highly satisfactory.

In the records of the Custom House the interesting fact appears that a very large proportion of the rails and other supplies used in building the Canadian Pacific Railway are taken to Canada by way of this city. The road is being built of foreign steel rails, and the material is landed at New York and thence transported through the United States, to be delivered in Canada.

The Driven-Well Patent.

In reply to letters of inquiry from correspondents asking for the present legal status of Green's driven-well patent, we print the following, which, we believe, states the case fully and correctly :

Nelson W. Green, a colonel of New York volunteers in the late war, to give the men of his command pure water, devised, in his own mind, a method by which this could be done. He first explained his idea to his drill squad, and afterward to the officers of his regiment, and it was this : To drive a rod sharpened at the end through the ground into the water-bearing stratum, and inserting in the bore a tube through which the water could be drawn by any ordinary style of pump. A test of this method was made successfully in 1861 on the plan of Green, and in the same year on the fair grounds at Cortland, N. Y., at the expense of one Graham, who had a contract to supply food and other necessary articles to the soldiers encamped there. This well was used generally by the men in camp, and by Graham and his employees. In 1868 Green procured a patent for this invention, and in 1871 had a reissue thereof, in which he claimed as his invention the creation of a vacuum in the lining of the well for the purpose of using the pressure of the atmosphere to bring up the water. In a suit—Andrews *vs.* Hovey—brought in the United States Circuit Court for the Northern District of Iowa, for an injunction and damages for the infringement of his patent, the defendant, first, denied that Green was the inventor of the driven well ; second, averred that if he was the inventor, he had abandoned his right to a patent by allowing a public use of the invention for more than two years before the granting of the patent, and, third, that the claim under the reissue was broader than in the first patent. On the trial the foregoing facts were shown, and it was also proved that this method of driving wells was used at Milwaukee, Wis., in 1849, and at Independence, Mo., in 1851, and it was also shown that the original inventor did not claim the creation of the vacuum and the effect of the atmospheric pressure. Judge Shiras, in dismissing the bill, said :

1. Whatever may be the intention of the inventor, if he suffers the invention to go into public use through any means whatever, without an immediate assertion of his right, he is not entitled to a patent, nor will a patent then obtained protect his right.

2. It is shown that in 1851, at Independence, Mo., a tube was driven into the water-bearing stratum, and, by a pump attached to the tube, water was drawn through it in an apparently inexhaustible quantity. This might be treated as a mere isolated experiment, which would not be held to defeat the right of an independent inventor. But in 1849 and in 1850, E. W. Purdy, a witness in this case, as he testifies, was a well-maker in Milwaukee, Wis., and he used iron rods about 2 inches in diameter and coupled together. The first rod was 16 feet long, with its lower end made for a drill, and it was worked in the earth by being run over a gin-pole, and so the earth was displaced. The 4-inch tubing was driven into the opening as the boring progressed. No soil was removed from the ground, except that where quicksands were struck a long sheet-iron bucket, with a valve at the bottom, was employed to bring up the quicksand. When the water was reached, if it did not come to the surface, a pump was attached to the tubing which formed the lining of the well. Purdy testifies that he drove a number of these wells, some of them to the depth of 60 and 100 feet. We must confess that we cannot see any substantial difference between these wells and those by the Green method.

3. It is urged that the great merit of Col. Green's invention consists in the discovery of the effect of the vacuum created. According to the view we take of the original patent, it did not cover or describe the application of this principle. It follows, therefore, that the reissue embraces the application of an important and material principle not found in the original. The rule is well settled that a reissue can be validly granted only for the same invention which was originally patented. If the reissue goes beyond this, and covers other and different inventions or improvements suggested by the use of the original invention, it will be void.

Large Marine Shafts.

The most ponderous forging about a marine engine is its shaft, and the huge size and great power of many of the engines now constructed require shafts of a size far beyond the capabilities of ordinary steam hammers. Up to a comparatively recent period all marine shafts were made of iron, but steel is gradually supplanting iron for this purpose, as it has for so many others. In matters of this kind European steel makers are far in advance of our manufacturers, having equipped themselves with very large hammers and other appliances for the successful manipulation of the large masses of steel required. The possessors of the largest hammers in Europe, and therefore in the world, are the Krupp Works in Germany, and the Creusot Works in France, which boast of 80-ton and 50-ton hammers respectively. There are several works in England which contain rather powerful hammers, but none of them, we believe, equals Krupp's hammer.

In this country there are several establishments which can turn out shafts of ordinary size, but the works possessing the largest hammer, and therefore capable of handling the heaviest forging, are the Black Diamond Steel Works, of Park, Brother & Co., at Pittsburgh, whose largest hammer is rated at 17 tons. Their most recent achievement in this line is an open-hearth steel shaft which is 33 feet long, 16½ inches in diameter in the middle, and 15½ inches in diameter at the journals. It weighs 24,000 pounds as finished. It is intended for the Mississippi Valley Transportation Company, of St. Louis, which is now engaged in carrying grain to New Orleans in barges which are towed by large steamboats. The Black Diamond Steel Works are now making two other large steel shafts.

The manufacture of these very heavy forgings is a new branch of business in the United States, and Park, Brother & Co. say that they experience some difficulty in securing enough orders to keep their large hammer in constant operation. At the same time the field is a promising one, as orders are constantly being sent abroad for steel shafts, and our domestic works will undoubtedly get a fair share of the business when it is proved that their shafts are as well made and contain as trustworthy steel as those made abroad.

NEW PUBLICATIONS.

SWINEFORD'S ANNUAL REVIEW—1882. Annual Review of the Iron, Copper and other Industries of the Upper Peninsula of Michigan, for the year ending December 31, 1882. Pamphlet, 200 pages.

Mr. A. P. Swineford, the senior editor of the Marquette *Mining Journal*, has, for a number of years, issued a review of the mining industries of Upper Michigan, which has acquired a recognized position among the statistical and technical publications of the country. More attention is paid to iron ore than to any other interest, as the number of iron-ore mines is very much larger than of other minerals. The production of the district is given by years from its development, and the exact condition and prospects of each mine are carefully set forth. The blast furnaces of the district are not overlooked, and careful descriptions of them are also given. Mr. Swineford manifests very great interest in his work, and the volume is evidently of much practical value to all connected with the iron trade. The United States depends so largely for its supply of iron ore on the Lake Superior district that knowledge of the operations there conducted is very desirable. It is unfortunate that other mining regions of the country do not have historians and statisticians as well as the Lake Superior district. We ought to have exact information every year of the quantity of iron ore mined in each State. According to Mr. Swineford's "Review," the production of the Lake Superior iron-ore mines in 1882 was 2,948,307 gross tons, valued at $24,263,742. There was an increase of over 600,000 tons on the quantity mined in 1881. This year, however, the production thus far is about 500,000 tons below that of 1882. The total quantity of iron ore mined from the beginning of operations in the district down to the close of 1882 was 20,590,840 tons, valued at $164,862,180. The quantity of refined copper produced in 1882 was 28,491 net tons, valued at $10,466,328.32, and the total production from the beginning down to the close of 1882 was 356,820 net tons, valued at $163,037,786.

Poor's Railroad Manual.

"Poor's Railroad Manual" for 1883 has just been issued, and, as usual, gives a complete review of the railroads of the United States. Some indication of the extensive character of the work is afforded by the fact that the compilation covers considerably more than 1000 pages, and is accompanied by numerous maps of different sections of the country. The introduction to the "Manual," embracing somewhat over 100 pages, has been printed separately for the use of the press, and will be found very convenient, giving, as it does, a fair idea of the year's work in a condensed form. Besides a brief general account, it contains tabulated statements showing the length of all railroads in the United States, their equipment, share capital, funded and floating debts, cost of roads and equipment, length of lines operated, traffic operations, earnings and payments, and a variety of other interesting details, together with a statement of lines of railroad constructed in 1852, and the total length of all railroads in the world.

Mexican Imports and Exports.—An official statement of the exports of Mexico for the fiscal year 1881–82, just published, shows that the United States is by far the best customer of Mexico, also that Mexico buys more from the United States than from any other country. The total exportation to the United States was $13,760,861.85, including $5,451,731.13 in precious metals and $8,309,130.73 in regular exports, while England, the next on the list, makes a total showing of $10,284,374.85, but, taking away the $8,696,379.07 in precious metals sent to that country, the ordinary trade sinks to the comparatively small sum of $1,587,595.78. The table of exports for the five years from July 1, 1877, to June 30, 1882, affords some instructive comparisons, showing a steady increase in the regular exports of the country through the entire period, the figures being $6,701,061.35 for 1877-78, $8,406,860.69 for 1878-79, $10,627,220.73 for 1879-80, $10,674,694.37 for 1880-81 and $12,019,526.06 for 1881-82. Meanwhile, notwithstanding the greatly increased importations, there has been a steady decrease in the exportation of precious metals. The amount exported shows a decrease from $22,584,599.55 in 1877-78 to $17,063,767.33 in 1881-82. Among the important articles of export which may be mentioned as having shown a remarkable increase in these five years are henequin, which has risen from $1,078,075.22 to $2,072,106.72 ; coffee, from $1,242,041.40 to $2,414,538.20 ; skins, from $997,043.21 to $1,708,554.15 ; vanilla, from $312,109.46 to $780,830.47 ; istle, $346,196.56 to $620,199.24 ; tobacco, $86,713.27 to $351,253.17 ; living animals, $30,099 to $137,621 ; indigo, $61,523.60 to $204,798 ; caoutchouc, or rubber, $9,055.96 to $114,455.92. Woods appear to have remained about stationary. Sugars show a slight falling off, and orchalla, the famous dye-stuff, a remarkable fluctuation. In 1877-78 the export was $225,145.73 ; in 1880-81 it had declined to $15,514.85, and in 1881-82 it advanced to $131,617.68.

A letter describing Tacoma, at the western end of the Northern Pacific Railroad, speaks of the splendid fir timber that grows in "almost inexhaustible quantity" in the neighborhood. Mills have already been erected to cut 200,000 feet per day, and if Tacoma grows in Western fashion it will not be many years before there will be a scarcity of timber there, as in other parts of the country, unless efforts are made to replace it.

H. D. SMITH & CO.,

Plantsville, Conn.,

Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE,

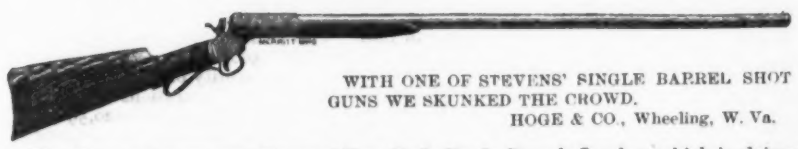
Manufacture the Largest Variety of Forge Carriage Irons, of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

IF YOU WANT A GOOD SINGLE-BARREL BREECH LOADING SHOT GUN,

BUY ONE OF STEVENS!



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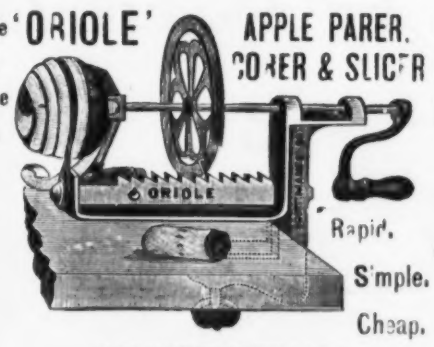

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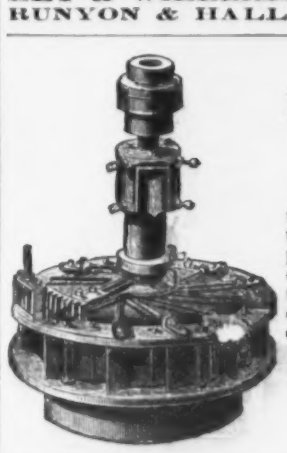

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Electrical Engineering.

Inspection of the annual catalogue of the Stevens Institute of Technology for 1883 shows that the department of applied electricity will hereafter receive increased attention at that school. "In view of the rapid developments of electrical science and the close relations existing between many of the new applications of electricity and the work of the mechanical engineer," reads a paragraph relating to the subject, "it has been judged advisable to extend the regular course of the Institute somewhat in this direction. The fact that a large number of our present graduates hold prominent and responsible positions in the electrical companies throughout the country, sufficiently proves that our course, as heretofore carried out, is well adapted to prepare those pursuing it for the profession of the electrical engineer, who must manifestly be first of all a mechanical engineer, and on this foundation build a certain amount of knowledge and experience in the special theory and practice of electric applications.

"It is believed that by the addition to our former general instruction in electric science of a special department of applied electricity as a part of our regular course, the actual requirements of the profession will be best met. The means of inaugurating this new department have been placed in the hands of the trustees, and it is confidently believed that what may be required for its permanent establishment will be supplied in due time by those most interested in this subject. In this department it is intended to supplement the theoretical knowledge acquired in our previous regular course by systematic laboratory instruction; in the management and care of batteries, galvanometers, rheostats, electrometers, condensers, &c.; in the measurement of resistances of wires, batteries, insulation resistance and capacity of cables, electro-motive force, &c. These and other experiments are to be made sufficiently numerous and varied to familiarize the student with electrical terms, as potential, electro-motive force, resistance, &c.; to give him a realizing sense of the various electrical magnitudes, as Volt, Ohm, Ampère, &c., and to point out the quantitative relations of these units to the ordinary mechanical ones. Special attention will then be given to problems in connection with dynamo machines, such as the measurement of powerful currents, determinations of efficiency in generators and in electric motors, photometry of arc and incandescent lamps, consumption of energy in generator, conductors and lamps, dimensions of wires for various currents, &c. By the courtesy of electric companies visits will also be made to examine their lighting plant and manufactories."

Hights of Church Spires.

Every one who has had occasion to note the hights of architectural works as given in guide-books, encyclopedias and other authorities on the subject, must have been struck by the varying figures often given for the same structure. The discrepancy is probably due, in many cases, to confounding the feet of different countries, these being of slightly different length. The following, which appeared in the Cologne *Gazette* just before the completion of the cathedral in Cologne, is said to be based upon accurate measurements, and will be worth preserving for reference:

"The two towers of our cathedral are now the highest buildings on the earth; they exceed by 1.50 m. the tower of St. Nicholas Church, in Hamburg, which is 144.20 m. high. When completed, they will measure 160 m., reckoning from the pavement of the cathedral cloisters, or 157 m. reckoning from the floor of the church itself. The following are the hights of the most remarkable high buildings in the world: Towers of Cologne Cathedral, 160m., or 157 m. (524 ft. 11 in., or 515 ft. 1 in); tower of St. Nicholas, at Hamburg, 124.20 m. (473 ft. 1 in.); cupola of St. Peter's, Rome, 143 m. (469 ft. 2 in.); cathedral spire at Strasburg, 142 m. (465 ft. 11 in.); Pyramid of Cheops, 137 m. (449 ft. 5 in.); tower of St. Stephen's, in Vienna, 135.30 m. (443 ft. 10 in.); tower of St. Martin's at Landshut, 132.50 m. (434 ft. 8 in.); cathedral spire at Freiburg, 125 m. (410 ft. 1 in.); cathedral of Antwerp, 123.40 m. (404 ft. 10 in.); cathedral of Florence, 119 m. (390 ft. 5 in.); St. Paul's, London, 111.30 m. (365 ft. 1 in.); ridge tiles of Cologne Cathedral, 109.80 m. (360 ft. 3 in.); cathedral tower at Magdeburg, 103.60 m. (339 ft. 11 in.); tower of the new Votive Church, at Vienna, 96 m. (314 ft. 11 in.); tower of the Rathhaus, at Berlin, 88 m. (288 ft. 8 in.); towers of Notre Dame, at Paris, 71 m. (232 ft. 11 in.)"

The above enumeration does not include the iron spire of the cathedral at Rouen, in France, which has been completed within a few years, after standing for many years without its apex or finial. The statements as to its hight vary somewhat, but all agree in making it a little higher than the Strasburg spire. Our Washington monument at the national capital is to be even higher than the Cologne spires, if it is ever finished. It will be observed that no American buildings are given in the list we have quoted.

Old Building Material.—An extensive trade in second-hand building material has been carried on in this city for many years back, being largely supported by builders and joiners. The stone and brick of an old building are used in the construction of a new one, the lime-whitened bricks making the inside of the outer walls and the partitions, and the stone going into the foundations. But it may not be generally known that the inside woodwork is used again, frequently without radical alteration. Many builders prefer this old timber because it is thoroughly seasoned, having been defended from the weather and been subjected to the influences of a measurably even temperature for years. The richer woods which are admired for their color acquire mellower tones by age, and become more valuable as the years pass. Everybody knows that furniture of mahogany and rosewood that has outlived several generations is much handsomer than that made from new wood. But it has an added value as mere material. An article made from the old wood will remain in its integrity in all its joints; its shrinking days are over. For the same reason the timbering, wainscoting and flooring of old buildings have an added value, although their selling price is less than that of new material.

Japanese Railways.

A correspondent of the Boston *Transcript* gives the following interesting account describing a trip on a Japanese railway:

A portion of the Tokaido (a leading highway) is now nearly deserted on account of the Tokio-Yokohama Railroad. Close to Yokohama is a small town called Kanagawa, and from this place the pilgrims now commence their tramp. Kanagawa is about 18 miles from Tokio, and third-class passengers can ride there for about 20 cents, certainly much cheaper than an 18-mile walk with the cost of a lunch. The Tokio-Yokohama Railroad is a Government affair, as everything else is here. Although it cripples individual enterprise, it secures the success of a thing to have the Government control it. The railroad and the telegraph systems are very satisfactory, and the postal system is just about perfect.

Trains are run between the two stations every hour and a quarter during the day, leaving both stations simultaneously. The whole equipment is English. The cars are divided into three classes. Even the first-class cars are decidedly plain. These are divided into three compartments. The second-class cars would hardly be used on a horse railroad in Boston. They are as plain as plain can be, and made just like a horse-car, having two long seats on the sides facing each other. The seats are upholstered with the same kind of matting which the Japanese use on their floors. The third-class cars have simply plain benches for seats. The exterior of all three classes is the same. The engines are smaller than the shifting engines in the Boston depots. The time required for the 18 miles' ride is 57 minutes. Everything pertaining to the road is kept in the best condition. The road-bed is like a floor; the cars are clean; the stations are clean; all the officials are uniformed. I never knew one of them to be in any way impolite. Passengers are not allowed to cross the track except by the bridges overhead. Following English custom, the trains run on the left-hand track. No baggage is allowed to go free, save such as one can take in his hand. You can take no living thing into the train, not even a canary, without paying an extra price. Posted up in the stations is a notice to the effect that the Government does not run its road for the transportation of dogs, but if dogs must travel, provision has been made for them. So every station is provided with boxes, latticed on top, in which poodle or mastiff can be transported for a definite sum. I understand that when it is necessary to transport a dead body an extra car is put on for the purpose.

Let us start on our 18 miles' ride from the Tokio station. It is a fine, large building built of stone, having two large entrances in front. The waiting rooms are furnished with the daily and native foreign papers. Five minutes before the train starts a warning bell is rung. The ticket office is styled a "booking office," and a notice tells you that you must be "booked" before you can enter the train. Just before the train starts the bell is again rung in the station and the doors closed, so there is no possible chance for a belated passenger to "run for the train," and possibly get run over by the train. There are no side doors, either, through which you can dodge the official. Having booked yourself, or purchased your ticket, you are allowed to pass through a very narrow passageway to the outward-bound train, showing your ticket as you pass. Although there is no gold leaf or bird's-eye maple on the cars, there are other arrangements that more than compensate for this loss of elegance. One of these is that by buying a round-trip ticket to any station you get a discount of 50 per cent. on return ticket—tickets good for one day only. Fare to Yokohama, first-class, $1; round trip, $1.50; second-class, 60 cents; round trip, 90 cents. No official goes with the train; no brakeman in dulcet tones whispers out the name of the next station. The only brake on the train is on a car made specially for that purpose, and attached to the rear of the engine. No conductor shouts, "Tickets, please," and when he has finished his rounds, sits down by the fair miss who goes daily for her music lessons. Every passenger is expected to enter the class car for which he holds a ticket. If he doesn't do this and he is found out, there is a penalty for his misdemeanor.

When it is time for the train to start, an official on the platform blows a little whistle, the steam engine blows a shrill whistle, which would be terrific if it were only powerful enough, and off we go. And now we see one advantage over the average American railroad—there is not the slightest jerk in starting; indeed, you never know when you are really in motion unless you look at objects outside the window. The train glides (that just expresses it), not swiftly to be sure, for if it were swift, probably the Japs would condemn it. Nothing upsets a native like swiftness—time is no object here.

The National Railroad Company, of Japan, incorporated, with a capital of $20,000,000, under the auspices of the Japanese Government, two years ago, has adopted the American system of building railroads, and is now constructing the main line, which extends from Tokio to Anderson, the northern seaport of Japan, a distance of 450 miles. A part of the main line, about 150 miles in length, has already been finished, and will be open to the public this month or next. The terminus of the line is the commercial center of a province where silk culture is the principal occupation of the people.

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AND

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Condition of the Iron Trade.

The present condition of the pig-iron trade may be termed one of expectancy. There is a perceptible movement, but it is very sluggish, and apparently cannot be quickened The future is regarded with great confidence, however, by very many of those interested in the trade, and an early improvement in the demand is predicted by some of the best informed. The setting in of autumn is accompanied by many circumstances which should exert a favorable influence on trade. Summer vacations are ended now, and a more serious view of life is taken by people generally than when they were sweltering with midsummer heat, or were trying to kill time at the seaside, the mountains or the springs. The fall movement in breadstuffs has commenced, and farmers are getting ready money, which they will undoubtedly put into circulation. The fall season in many lines of goods has opened briskly, and it is perfectly reasonable to expect the iron trade to sympathize to some extent. Again, railroad building is not dead, and there are projects in contemplation which will be put under way next year, though, of course, they will not be on as great a scale as the enterprises which have been in progress of construction for the past few years. It remains to be seen how much effect these various factors will have upon the pig-iron trade, but they all contribute to the feeling of hopeful expectancy which is now prevalent. There is no encouragement for idle furnaces to blow in, however, as there will hardly be much improvement in prices, even if the demand does slightly increase. An enlargement of production will very probably postpone general improvement and cause demoralization. The pig-iron trade seems to have specially felt the burden of the season's dullness, and it needs to be carefully handled.

The trade in manufactured iron is generally in a satisfactory condition. There is very little doing in bar iron, comparatively speaking, and prices are almost at bare cost, but shapes, plate and sheet iron and nails and spikes are in good demand at prices which afford a profit, although it is a very small one. Not every mill is employed, and it is best that all should not be active, for if they were the production would evidently exceed the consumption, and demoralization would ensue. There may be some trouble in sustaining prices at their present range, now that mills are able to run more steadily than during the summer months, but as yet there is no indication in this vicinity of any weakness.

The steel trade is in good condition, so far as steel rails are concerned, but the demand for merchant steel is not what it should be, and prices are so low as to be profitless. The competition of Bessemer and open-hearth steel has greatly reduced the price of low-grade crucible steel, and there is also a foreign competition beginning which has been encouraged by the low rates of the new tariff.

Last Year's Foreign Trade.

In our last issue we briefly reviewed the preliminary report of the foreign commerce of the United States during the past fiscal year, recently issued by the Bureau of Statistics. Though the facts and figures there given touch upon the more prominent features of the subject, some detailed statements may be found desirable. Thus, as regards the values of imports and exports of merchandise, and the excess of one or the other, the following table will be found interesting, showing, as it does, the import and export movement for each year since 1870, the figures being arranged in groups of five-year periods in order to make comparisons more convenient:

Year ending June 30.	Total exports.	Imports.	Excess of exports or imports.	Total imports and exports.
1871	$442,820,178	$520,223,684	Imp. $77,403,506	$963,043,862
1872	444,177,586	626,595,077	Imp. 182,417,491	1,070,772,663
1873	522,479,922	642,136,810	Imp. 119,656,888	1,164,616,132
1874	586,283,640	567,406,342	Exp. 18,876,698	1,153,689,982
1875	513,442,711	533,025,436	Imp. 19,502,725	1,046,468,147
Total 5 years.	$2,509,203,437	$2,889,366,749	Imp. $380,163,312	$5,398,570,786
Average.....	501,840,687	577,873,349	Imp. 76,332,662	1,079,714,037
1876	540,384,671	460,741,190	Exp. 79,643,481	1,001,125,861
1877	602,475,220	451,323,126	Exp. 151,152,094	1,053,798,346
1878	694,865,766	437,051,538	Exp. 257,814,234	1,131,917,298
1879	710,431,441	445,777,775	Exp. 264,661,666	1,156,217,216
1880	835,638,658	667,954,746	Exp. 167,683,912	1,503,593,404
Total 5 years.	$3,383,803,756	$2,462,848,369	Exp. $920,955,387	$5,846,652,125
Average.....	676,760,751	492,569,674	Exp. 184,191,077	1,169,330,425
1881	902,377,346	642,664,628	Exp. 259,712,718	1,545,041,974
1882	750,542,257	724,639,574	Exp. 25,902,683	1,475,181,831
1883	823,833,656	723,180,914	Exp. 100,652,542	1,547,014,570

It will be readily seen from this that since 1876 an unusual expansion in exports has occurred, due, in a great measure, to the rapid agricultural development of the country. The imports also have since that time shown a steady increase, but not before having experienced a sudden decline, amounting to somewhat over $73,000,000. Altogether, the exports for the year ended June 30, 1883, when compared with those of 10 years ago, exhibit an increase of over $300,000,000, a similar comparison with the imports, on the other hand, yielding an increase of only $80,000,000. The fact, however, should not be ignored that the imports preceding the panic of 1873 offer no guide to our legitimate consumption or actual wants at that time, having been raised to an unnaturally high figure by speculative movements. It is, therefore, but proper to give this point due consideration when regarding the present figures for imports. In the year 1880, as shown in our table, the imports exceeded those of 1873 by some $25,000,000, and two years later another increase, amounting to some $57,000,000, as compared with 1880, was experienced. This large expansion was in a great measure accounted for by an increase in the importation of certain articles of food rendered necessary by a short crop. But during the past fiscal year, when this circumstance could not be taken into consideration, the falling off did in no way correspond with what might have been anticipated. In fact, the decrease amounted to little over $1,500,000. Reviewing the figures for the year shows that in certain large items there was a decrease, but the increase in other directions almost counterbalanced it. The largest decrease, as might naturally be expected, was noticed in connection with iron and steel, the figures for 1882 and 1883 being $51,377,633 and $40,796,007 respectively. Coffee, tea, barley and potatoes likewise show large reductions, while in such items as cotton manufactures, wool, tobacco, &c., an increase is recorded. The extent to which tariff changes affected these importations can be only vaguely estimated, but that they exerted some influence cannot be doubted.

Even a casual inspection of the table of exports and imports given above will, perhaps, impress upon the reader the fact that, notwithstanding the large crops of last season, the value of exports falls short of that for the year 1880 and of 1881. With the exception of corn, the crops were the largest ever harvested in the country, and it may seem singular that this circumstance should not be reflected in the exports. In explanation of this, it is very appropriately pointed out that the crop year and Government year are not identical, and that the corn crop last year, which was 422,000,000 bushels greater than that of the previous season, did not count in the exports to any extent until the second half of the fiscal year. But there is still another factor which may escape attention. That portion of the crop (usually a heavy proportion in years of large yield) which is turned into meat did not make itself felt at all, since the process require time. The smaller provisions exports this year are really the effect of the drought of 1881, and also the work of the severe winter that preceded the drought, and which destroyed so many cattle on the Western plains. From this it would seem that larger exports of provisions during the current fiscal year should follow as a result of the more favorable conditions which prevailed in 1882. In this connection the following table, giving the value of each of our leading staples of exports, will prove of interest:

Staple.	1882-83.	1881-82.	1880-81.
Cotton.....	$247,328,721	$199,812,644	$247,695,746
Breadstuffs...	202,971,491	177,001,396	265,561,091
Provisions, &c	98,726,459	112,875,270	145,622,078
Petroleum....	44,013,079	51,232,706	40,315,609
Total.....	$593,039,750	$540,922,016	$699,194,524

These figures strikingly show the importance of the staples in question, cotton being at the head of the list.

So far as the position is concerned which the different ports occupy in the trade movement, New York, as usual, boasts of the first place, the percentage of exports shipped in 1882-83 amounting to 43.88 per cent. of the whole, and the proportion of imports received being 68.59 per cent. Comparing these figures with those for the two preceding years, it is noticed that there has been practically no change in this direction, and under the increasing competition of adjoining ports, New York seems, in fact, to gain slightly. Next in rank to New York in the line of exports comes New Orleans, with 11.54 per cent. of the whole, and then follows Boston with 7.57 per cent., Baltimore with 6.69 per cent., San Francisco with 5.46 per cent., and Philadelphia with 4.63 per cent. As regards imports, New York is followed by Boston with 10.04 per cent., San Francisco coming next with 6.32 per cent.; Philadelphia is represented by 4.66 per cent.; Baltimore by 2.02, and New Orleans by 1.33. The figures available in this connection would seem to suggest that only a few ports, such as New York, Boston and San Francisco, seem to have been able to retain or improve their position as respects imports, notwithstanding the fact that they may have largely increased their exports. In the line of exports a much greater fluctuation is noticeable, and the relative positions of the different cities depend largely upon good or bad crops, and, as the latter are without influence on larger trade centers, it is not surprising to notice corresponding variations in the figures for New York or other ports of importance.

The Fall Trade Outlook For Stoves.

There is a general disposition among stove manufactures to take a hopeful view of the fall trade outlook. It is admitted that trade is late, and that buyers are showing much caution in supplying their prospective wants, but no one, so far as we know, entertains the opinion that the aggregate trade of the season will not be satisfactory. Prices, in the main, are well maintained, but we hear a good deal of *sub rosa* gossip about exaggerated credits. It is stated, on what is assumed to be good authority, that a good many orders have been secured for June, July and August shipments, on agreement to date bills Sept. 1, give the usual four months, collect on goods sold up to Jan. 1, and extend on those remaining unsold until April, or at the dealer's convenience. We do not know how much of this sort of business is done, but, much or little, it is utterly demoralizing. Goods "sold" on such a basis are not sold at all. They are in reality placed with dealers on consignments. The dealer who conceives that such a system is favorable to his interests does not know as much now as he will learn from experience. No manufacturer can afford to do business on such a basis, and no dealer can afford to waste his time introducing goods so distributed, for he will need to do the whole thing over again when he has to change his line. We are glad to believe that this reckless abuse of the credit system is not general, and that the better class of dealers are not asking nor expecting such terms.

Concerning the "lateness" of the stove trade this year, we think it neither surprising nor alarming. The tendency is steadily in that direction, and each year is likely to make it more evident. The only check upon the tendency of the dealers to postpone all purchases until the last minute is the inability of the manufacturers and wholesale agents to ship their entire stock between the time dealers are good and ready to order and the time at which they must have their stock in saleable condition. No house does or can maintain the machinery needed for distributing its entire product on September 1, but the dealer is very apt to forget that his order is only one of a great many, that every other tardy purchaser wants his goods shipped the 1st of September, and that the chances of his being disappointed are extremely good, whatever the promises made him. This evil is one which will necessarily correct itself to some extent, but we shall never get back to the condition of affairs which existed when the dealer had to seek goods early to get them at all. The policy of the leading concerns has been shaped with a view to accommodating the dealer to the fullest extent, and encouraging procrastination on his part by the accumulation of supplies so near at hand that the delays of shipment are reduced to a minimum.

The goods prepared in anticipation of the fall trade this year are varied in quality, and so ample in quantity that there is little reason to expect a scarcity. On the other hand, we do not believe that the stocks carried over by makers will be any larger than they should be to provide in advance for the contingencies of next year. Unless we are much mistaken, the production in the first six months of 1884 will be a good deal below that for the first half of 1883—that is, unless wages are reduced without resistance on the part of the union. This question is by no means a local issue. It is the chief topic of discussion in all the principal centers of production, and there are many indications of a disposition on the part of manufacturers to get things in good shape to handle it, in whatever form it may present itself. In view of this, a stock on the 1st of January somewhat in excess of that usually carried over would not be regarded as something to be deplored. We do not think, however, that many more stoves have been made than it was expected would be sold. Dealers are not burdened with stocks carried over, and the general situation is such as to warrant the belief that there will be a fair average original consumptive demand, and something more than an average demand for the replacement of stoves discarded or worn out in service. The average life of a stove is growing steadily shorter. This is in part due to the fact that stoves are lighter, more elaborate and less durable than they used to be; in part to the more careless management they receive at the hands of servants, and in part to the fact that buyers are attracted by new styles, which promise greater convenience and economy than old ones which have done service for years. The replacement demand is also increased by the gradual extension of the area of regular coal supplies and the increasing cost of wood in the more populous districts, and as coal stoves burn out sooner than wood stoves, they need more frequent renewal.

In the Western markets some anxiety is felt respecting the corn crop. The weather has not been quite favorable to the development of the ears, although the luxuriance of the stalks would indicate an enormous harvest if the yield per acre is estimated from a car window. A shortage in corn would be bad for general trade, and dealers in the districts in which corn is the chief product are not quite sure whether the demand for stoves will be up to or below the average. We do not, however, fear a shortage of corn. The best advices we can get warrant the prediction that the crop will reach the normal average of 1,800,000,000 bushels. Wheat, on the other hand, will be at least 100,000,000 bushels short, reducing the estimated yield to about 400,000,000 bushels. Winter wheat was mostly a failure, and this fact has cost the wheat district $100,000,000 in round numbers. There is, however, an unusually large harvest of hay, oats and other profitable crops, and the farmers are likely to make a fair average profit. There is some uncertainty with regard to the cotton crop. In many parts of the South it is reported that the yield per acre will be considerably below an average, but it is not known how far this will be compensated by the increased acreage planted. We are of the opinion, however, that any loss of trade due to failure of crops will be felt only locally, and that the consumptive demands of the country will call for fully as many stoves as were needed last year.

The only danger which seems to threaten the trade at the moment is that some weak-kneed houses will become nervous and start a break in prices. Margins are narrow, and there is not much room for cutting unless those who may engage in the pastime feel like doing business for nothing and finding themselves. This fact will probably place a wholesome restraint upon any tendency which might develop to add lower prices to long credits as inducements to dealers, and since prices have been maintained fairly firm up to this time, it is scarcely probable they will break right at the beginning of the season of greatest activity, or at all, unless the September trade should be utterly disappointing.

In a word, the trade at large are feeling confident. Nothing like a boom is expected, but it is believed that this season's business will be as good as last year's, and that there will certainly be a chance to "make a little something," unless present appearances are deceptive and all calculations are disappointed.

A feature of no little interest as regards the strikes recently ordered by the Building Trades Union was developed in connection with the work of Contractor John J. Tucker, who now has a number of buildings under way in this city. As is generally known, the greater number of employers readily yielded to the demands of the strikers, and at the time of our last writing we had not heard of a decided stand being taken against the dictation of the union. Mr. Tucker's refusal to recognize any distinction between union and non-union men must, therefore, meet with general approval, and further developments in the contest will undoubtedly be pursued with much interest. In conversation with a reporter of one of the daily papers, Mr. Tucker said: "I employ both union and non-union men, and I recognize no distinction between them. When they are doing my work they must obey my rules, and not those of any outside organization I shall, so far as possible, employ non-union men in the place of those who have struck, and if I should not be able to do my work with such men it will go undone until the union men come to their senses." The fact that the work now being carried on by Mr. Tucker is of no little magnitude adds considerably to the importance of the movement. The strikers, it appears, are confident of gaining their point, and as it is thought that the future of the amalgamation of the building trades hinges on the present struggle, it is more than probable that both sides will spare no efforts calculated to bring about a successful issue. As it is, the activity now prevailing in the building trades is strongly in favor of the men, and the final result depends simply upon the length of time that employers can afford to have their work delayed.

Statistical Position of British Pig Iron.

We have the latest report of the British Iron Trade Association, which contains some statistics of interest. The following table shows the make of pig iron in Great Britain during the first half of 1883, as compared with that for the first half and second half of 1882, in tons:

	First half 1882.	Second half 1882.	First half 1883.
Cleveland.....	1,332 543	1,356 107	1,373,817
Scotland.....	556,600	569,400	570,000
West Cumberland....	472,038	529,143	411,647
South Wales.....	476,536	406,769	406,102
Lancashire.....	302,668	390,071	345,019
Derbyshire and Notts	228,653	217,082	194,219
South Staffordshire..	190,442	208,001	189,000
North Staffordshire..	157,386	159,731	146,021
West and South Yorkshire.....	111,096	128,157	144,500
Lincolnshire.....	102,861	98,700	108,118
Northamptonshire...	97,475	102,640	111,641
Shropshire.....	39,275	41,200	37,320
North Wales.....	25,672	23,041	21,199
Gloucestershire, &c...	25,000	23,000	18,500
Totals.....	4,241,245	4,253,042	4,138,225

The reduction of the pig-iron make has not been as great as we should have expected, considering the amount of discussion to which it has given rise. The statistical position of pig iron is not, however, as unsatisfactory as may have been expected. The following table shows the stocks of pig iron in makers' hands and warrant stores, June 30, 1883, compared with that on June 30 and December 31, 1882:

	June 30, 1882.	Dec. 31, 1882.	June 30, 1883.
Cleveland..	338,571	266,179	275,094
Scotland.....	636,537*	627,960*	584,400*
West Cumberland.....	56,453	101,356	56,943
South Wales.....	57 821	78,519	73,253
Lancashire.....	90,671	8 200	60,486
South Staffordshire...	40,573	38,802	67,500
North Staffordshire...	42,851	47,523	56,487
Derbyshire and Notts.	20,681	37-757	22,299
South and West Yorkshire.....	29,635	54,180	45,000
Northamptonshire....	15,486	18,720	24,000
Lincolnshire.....	15,803	60,218	19,620
Shropshire.....	18,930	21,400	21,000
North Wales.....	2,437	3,740	2,291
Gloucestershire, &c...	5,320	4,220	1,460
Totals.....	1,371,769	1,368,854	1,315,775

* Stock in warrant stores only, makers' stocks at June 30 being unknown.

The following is a recapitulation of the statistics showing consumption:

	Tons.
Stock of pig iron on December 31, 1882	1,368,854
Production of pig iron during the first half of 1883	4,138,225
Total	5,507,079
Deduct stock* at June 30, 1883	1,315,775
Total consumption of pig iron to June 30, 1883	4,191,304
Being at the rate, per annum, of	8,382,608
Against an actual consumption in 1882 of	8,652,655
Showing a decrease of	270,047

* Makers' stock in Scotland not included, being unknown.

A decrease in the estimated consumptive demand of 270,047 tons is alone proportionate to the decrease of 103,020 in the make for the first six months of the year.

Prospects In the Copper Market.

Copper is at present in a position deserving attention, and to some extent has begun to attract it, from the fact that considerable speculation has of late been going on in England, where a few large operators have secured the control of Chili bars. As American copper has been more extensively exported to Europe this year than ever before, the position of our market is of as much interest to the metal trade in Europe as it is to ourselves, and there is no doubt that our market for the remainder of the year will be greatly influenced by the course of prices in Western Europe. Under date of June 28, a correspondent in Liverpool, a large receiver on consignment of American copper and ores, wrote to us as follows: "An increased production of about 7000 "tons fine was required to keep up stocks in "England and France at the end of this year. "and to the level at which they were at the "commencement of it, assuming consumption to be the same this year. As far as "I can, however, at present judge, this deficiency will be more than made up by the "imports from the United States, say, 7000 "tons into England and 4000 tons into "France over last year's supply from "thence."

The export from the United States, reduced to fine copper, to England and France last year will, by reference to the official figures, be found to have been 3000 tons, all told; adding thereto the 11,000 tons expected by our correspondent, this would give the two countries named jointly this year an American supply of 14,000 tons. We estimated this year's export to all quarters in our metal report of August 30 at 19,000 tons, between copper, ore and cartridges, the latter being put at 1000 tons. After deducting a couple of thousand tons taken and to be taken by European countries outside of England and France, and the 1000 tons cartridges going to China, &c., England and France would take, according to that estimate, 16,000 tons, instead of 14,000, unless during the last four months of the current year either a decline in Europe or an advance here causes a decrease in the total.

This will suffice to show the importance attaching to the course of prices in Europe and here during the remainder of 1883. Should the Chili-bar speculation in England prove a final success—that is to say, if it causes an advance in value, or at least if the metal remain at its present figure—we should require quite an improvement in prices here to materially curtail the 19,000-ton estimate. Whether Europe will remain steady, or even advance, it is impossible to say, as it depends on the money market and other contingencies, the strength of the speculative holders, &c., but we can form some judgment as to the probable statistical position here at the end of the current year if we ship the entire quantity alluded to.

We assumed in our estimate of August 30 that on January 1, 1883, the stock on this side was 10,000 tons, and that the joint product this year would prove to be 46,000 tons, making an aggregate supply of 56,000 tons to be dealt with. From this we deducted 19,000 tons of probable export and 32,000 tons of probable consumption—together, 51,000 tons—which would leave a stock of only 5000 tons at the close of 1883. We say "only," because it would not suffice to carry us to the opening of navigation early next summer; and we gave it as our opinion that, if the facts should verify these calculations, there would not unlikely be an upward tendency in the copper markets on this side in anticipation, even without the aid of the speculative element. Should the latter co-operate, the advance would be all the more rapid and important. If, then, the stock—that is, the available supply—on January 1, 1884, does not suffice for our future requirements, the price may by that time be high enough to attract copper from Lake Superior by rail this way, as well as to other localities that may need it. As we before stated, prices in Europe will have a direct influence here in the interval. It will be seen, therefore, that the copper situation is rather complicated—more so than at any previous time in our recollection. Copper was never so cheap, and, therefore, never before deserved so much notice from capitalists. At its present price it may be considered to have arrived at its intrinsic value on an average—even slightly below it—and an imperishable article, easily stored and of large consumption, when in a position like the one we have endeavored to explain, seldom goes begging a long time in an active country like ours.

Foreign Export Markets.

The Argentine Republic is among the most prosperous of South American States, and the encouragement given to European immigration may be said to be the secret of her success. The dispersion of thousands of Italian settlers through the agricultural sections of the country has greatly enhanced the value of tillable lands, not only by augmenting their assessed valuation, but by increasing enormously the quantity of exportable products. For some reason not yet fully explained, the first half of the present year, in comparison with the first six months in 1882, does not afford a favorable comparison, so far as the foreign commerce of the Republic is concerned. Taking the trade figures of the Province of Buenos Ayres for the half year, we have the following:

	1882.	1883.
Imports	$23,295,000	$30,246,000
Exports	28,592.000	24.983.:00
Total	$51,887,000	$55,229 0.0

The disproportion of imports here observed is easily accounted for by the demands for railway materials of foreign manufactures which are required in improving the means of internal communication. And as regards the decline in exports, it is probable that labor has been diverted temporarily from grain growing and cattle grazing to the more pressing work of railroad construction. What the United States is doing for Mexico has a close parallel in the development of the Argentine Republic through British enterprise. With her frequent steamship connections and abundant capital—all made auxiliary to her plans for commercial aggrandizement—England is securing for herself and gradually enlarging the field for successful traffic in the Occident, no less than in the Orient. Meanwhile, what can be said of the progress making by the merchants of the United States in securing distant markets? When the foreign field is fully in possession of rivals, any subsequent revival of our merchant marine will not speedily lead to the displacement of European traders and manufacturers already in possession. It is true now, as of old, that "while the husbandman slept, the enemy "came and sowed tares."

Notwithstanding the "enormous advantage of free trade" in their favor, the British steel-rail makers do not seem to be any more prosperous and happy than their unfortunate American competitors. They, too, have had a "break" in the market. Cammel & Co. have booked no orders on Indian account for some time, and other English firms have failed to secure business, even at the extremely low prices they are said to have offered. It is a matter of some uncertainty whether steel rails have actually declined to £4, but whether or not this figure has been reached, it is not far from the actual selling price. It is asserted that even the most favorably situated manufacturers are making no money on rails at £5 per ton, and on the basis of present quotations the business cannot be said to be an inviting one. Now, the persistent advocates of a free-trade policy in this country will of course argue that, if it were not for what remains of the duty on steel rails, the wants of our railroads could be met with rails at $20, and the difference between that figure and the price asked here would be saved to the consumer; but when we come to look into the reason for the low prices now prevailing abroad, we find that this assumption is not warranted. The *Ironmonger*, in explaining the situation in the rail market, says: "For some years past "our best customer for these articles has "been the United States, but the country "has fallen away to an enormous extent of "late as a buyer of rails, owing to the fact "that railway construction has not been so "energetically carried on, besides which the "producing powers of the native mills has "been so greatly enlarged that they are "more than equal to any demand that may "be made upon them. Prices have fallen to "$36 and $38 per ton, at which figures our "rail manufacturers are unable to compete "with success, save on the Pacific Coast and "at certain points in the South." Restore the American market to the British steel-rail makers, and the result would be an immediate advance which would bring the cost to the consumer above what he now has to pay. Protection in the United States is the worst possible policy—for England.

Freight Transportation.

The commercial supremacy of New York as an American seaport is again assured, if, indeed, its position in this respect was ever seriously threatened. Neither the Welland Canal and St. Lawrence River, nor the Mississippi River, with its huge fleets of steam barges, are successful rivals. The experience of the last few months under the free-canal system shows this to be true, and it is well to make a note of it. The people of the Canadian Dominion believed in the possibility of superseding De Witt Clinton's "ditch" as a highway for transportation between the Northern Lakes and the Atlantic, and expended millions of public money in the expectation of diverting traffic to the St. Lawrence. Since the opening of navigation last spring they have waited in vain to witness the triumph of their grand system of internal improvements completed at so great a cost. The action of the New York State Legislature in declaring the Erie Canal free of tolls seems to have been fatal to their hopes in this respect. At least, it would appear that nothing short of corresponding action on their part in regard to the St. Lawrence route can relieve Canada's lake commerce from its present stagnant condition. Until some such course is taken relief seems hardly possible. Meanwhile business on the Erie Canal is booming, perhaps as never before. A recent official report showed that nearly 2,000,000 tons of freight had been transported by that route since the opening of navigation, or an excess of about 200,000 tons compared with 1882, and during the week just closed the clearances from Buffalo were far larger than during any previous week this season. At the same time, it is observed that traffic on the Welland Canal is below the usual average. No less significant is the reduction of charges by competing railway lines. These were placed at a disadvantage by the addition of newly finished lines, all alike struggling for a share in Western business. But the people of New York State and of the country at large take satisfaction in knowing that the so-called "monopolists" are constrained to recognize the existence of a regulator in freight transportation.

The *Tribune*, discussing the explosion which last week sent the steamer Riverdale to the bottom, says: "The trouble is that the "elaborate legal regulations for the inspection "of hulls and boilers and for the licensing of "captains and pilots, and the determination "of the number of passengers each steamer "shall carry, are not sufficient to guard against "danger. Something is needed to determine "the qualifications of the men intrusted with "human lives. There is an enormous amount "of travel on the waters of New York, and "all sorts of boats are used and all sorts of men "are intrusted with the management of them. "Perhaps, under the circumstances, we have "reason to be thankful that we escape with "so few accidents." In our judgment the trouble is that by its elaborate regulations, inspections, licenses, &c., the Government assumes so large a share of the responsibility for the safety of life in steamboats that individual owners, by a perfunctory compliance with the letter of the law, can evade any personal accountability in case of accident. If the Government could insure safety, its present system would be well enough, but it cannot, and no further complication of the law would secure this result. It would be much better and simpler to abolish the whole business, and substitute a code of laws defining the measure of responsibility assumed by owners of boats licensed to carry passengers, and then leave them free to adopt such measures of safety as they saw fit. Under such circumstances, there could be no dodging behind inspection certificates when boats burn or boilers explode. The owners of a boat would not run the risks they now assume with impunity if the consequences to themselves, in the event of fatal accident, were the confiscation of their property and imprisonment for terms of years proportioned to the gravity of their offense. One conviction and exemplary sentence under such a law would settle the whole business, and send to the junk yards forthwith a score of old tubs which are now sailing under a full complement of United States certificates. A sharp definition of the individual responsibility of steamboat owners is all that is needed, and each one might then be left to seek safety by the means best calculated to secure it. The owners and officers of boats know a good deal more about them than inspectors are likely to find out, and those whose boats are unsafe dread nothing so much as having to assume a personal responsibility for the safety of the passengers they carry. The present law suits them vastly better.

At intervals which are altogether too frequent the railroads of the country seem to be attacked with an epidemic of accidents of an unforeseen or unexpected character. Just at the present time one of these epidemics is apparently prevailing, and we have a series of accidents which are not likely to be soon repeated. We speak of these accidents as unexpected or unforeseen, and yet in some cases proper precautions would have diminished their severity very materially. We have known of cases where, in the center of a large plain, a railway has been undermined and trains delayed on account of a washout, the sandy loam going down in a culvert and leaving the track unsupported for a long distance. Such an accident as this was to a certain extent unexpected, yet it might have been foreseen that so large a drainage area would furnish a great volume of water in a sharp shower, and some provision ought to have been taken for carrying it off without endangering the road-bed by so doing. When one train gently smashes into the rear of another, and bursts open a freight car, the accident is hardly worth a place in the accidents of the year; but in a recent instance the freight car which was struck by the engine happened to be loaded with gunpowder. The explosion was so terrific that it is a wonder any persons were left to tell the tale. Naturally, railroad men will not look forward to a similar accident in the immediate future. The last one that at all resembled it was the nitro-glycerine explosion at Worcester, Mass., but in this case it was supposed that the leaky cans let the nitro-glycerine fall upon the track, and the shock of the wheels exploded it. This, in turn, fired that in the cars.

It seems that another attempt is to be made to put the Great Eastern into a paying commercial work. This time she is to be converted into a collier, and it is supposed she can carry some 20,000 tons of coal. One of the scientific papers commends this, and speaks of the Great Eastern as having been a mechanical success, but a mercantile failure, and attributes her bad fortune to her immense size and unwieldiness. The trouble with the Great Eastern, we think, has been all along that she was a mechanical and engineering failure. At the present time there is little doubt that a strong, swift ship of her tonnage could be made practically useful in the Atlantic trade. The Great Eastern is strong, but she is also slow. She is provided with engines of an obsolete pattern, and from an engineering point of view must be considered an abortion, in that she has both paddle-wheels and a propeller. Scott Russell's statements in regard to the vessel and his enunciation of the wave-line theory are at variance. Apparently he thought she ought to make a speed of 20 miles per hour or more, yet one would hardly expect any such speed from a vessel with such a bluff bow. The history of her career has been a chapter of mechanical accidents and failure. Once the great ship was saved by the pluck and ready skill of an American engineer. Several times she has been saved only by her immense strength. Her draft of water has always been too great to admit of her taking part in the world's commerce. If they keep her in the coal trade one coal mine will certainly be required to supply her with fuel, and she will have to select those ports where great draft of water can be had.

The Senate Committee who are looking into the subject of labor are compelled to listen to an immense amount of nonsense in the way of testimony. This cannot be avoided, of course, but it is unfortunate that the time of the committee should be taken up in listening to the lurid prophesies of communists, who predict revolution and destruction if some vague and impracticable "concession" is not made to the "demands" of labor, which have never been specifically formulated. The professional agitators who delight in this kind of talk are as much out of their element in this country as fishes on land. They have a certain local influence in the neighborhood of Tompkins Square, and could, probably, by concerted action, organize a riot in that part of New York, but they claim the attention of the police rather than of the Senate Committee. They are in no sense representatives of labor, and are not entitled to speak for the class of workingmen who are of any use to the country.

In its present shape Mr. Keely's "motor" must be a very interesting and curious machine. Mr. Schuellerman, secretary of the company, says of it: "The machine will "first be used as a stationary engine. It "will then be used as a locomotive. The "machine will be placed on a truck, but as "a locomotive engine its movements are "entirely different from those of a station-"ary engine." The movements of a locomotive are usually quite different from those of a stationary engine, but a machine which combines both movements and which can be used interchangeably must contain several patentable features of novelty.

Speaking of Mr. Robert P. Porter's contributions to the New York *Tribune* on the subjects of "Industrial England" and "Industrial Germany," a London trade paper which should undoubtedly be much better informed remarks that "One fact is sometimes worth "a long argument. How is it that such enor-"mous numbers of Germans leave their "happy land and cross over to America, "while so few Englishmen (comparatively) "emigrate to the United States. The an-"swer is that Mr. Porter's reports are docu-"ments manufactured to order for his em-"ployers—protectionists in America." The correct answer, if the paper in question cared to be candid in the matter, was given by Mr. Porter some time ago, and has since been printed over and over again in response to similar inquiries. The remarks above quoted, therefore, either betray a lamentable lack of information on current topics, or a willful perversion of the truth. The assertion that "the working classes in this country "(England) can, if they will, surround them-"selves with comforts and luxuries which "the Germans cannot even aspire to," lacks all foundation, and it would, indeed, be surprising that the English workingman should live in such destitute circumstances simply because an improved condition offers no attractions.

The crop of elevator accidents is turning out well this season. In both quality and quantity it is all that could be asked for by the most sanguinary individual. The last one that comes to our notice is one of those runaway elevators which had a habit of starting off on its own account, and traveling up or down, as the case might be. A green elevator boy was in charge, and instead of waiting until the car had passed, and handling the rope from below in a place of safety, he sprang half-way into the car and seized the rope just in time to be crushed between the bottom of the car and the top of the door. The number of accidents from poor elevators and green attendants, it is likely, will be constantly increasing. The reason for this increase is to be found in the fact that the number of elevators in use is much larger now than ever before, and these elevators, as they wear, are becoming more and more liable to accident. In many places, when an elevator is put up, the feeling in regard it seems very much like that of putting in a window, a foundation or a door. It is something that has been done for all time, and no more attention needs to be paid to it. The remedy will come when a sufficient number of people have been killed and public opinion is thoroughly aroused on the subject of making elevators safe.

SCIENTIFIC AND TECHNICAL.

A Constant Current Battery Cell.

According to *La Nature*, a constant current battery cell was devised by Dr. E. Obach while conducting experiments to furnish a constant current of long duration. It is described as a Bunsen battery, employing zinc, water acidulated with sulphuric acid, and so arranged as to secure a continuous renewal of each element is, on an average, .07 ohm, and the electro-motive force is 2.09 volts. It is able to furnish nearly 30 ampères in a short circuit, and consists of a jar some 8 inches in hight and 5 inches in diameter, placed in an inverted position over a support, the bottom having been replaced by a wooden cap covered with paraffine. A porou earthenware vessel introduced with this jar is held in place by a cork ring, and is about 9½ inches in hight and has an internal diameter of 2½ inches. The choice of the porous vessel is very important, and the proper working of the element depends much upon the quality of it. Those employed by Dr. Obach became entirely saturated one minute after having been filled with water, this giving the measure of their porosity. The porous vessel is closed with a cork saturated with paraffine and traversed by a carbon. This latter, which is retort carbon, is 9 inches long by 1½ in diameter, and contains in its center an aperture 6 inches in diameter and 7 inches in length. In its upper part there is a series of small radiating holes, and a glass tube whose upper extremity is funnel-shaped reaches its summit and traverses the porous vessel as well as the cap of the jar. The bottom of the porous vessel is paraffined, as is also its upper edge and the head of the carbon. A gutta-percha ring resting upon the bottom of the jar forms a channel which is filled with mercury, and into this dips the lower part of a zinc cylinder some 6½ inches long, 2½ inches in diameter, and weighing about 4½ pounds. Through the cork closing the lower part of the jar pass two tubes, and through the wooden cover two funnel tubes, one of which terminates in the upper part of the zinc vessel, while the other runs to the bottom of the porous vessel. Nitric acid reaches the bottom of the latter by means of this tube, and, rising, flows off through the radiating holes in the carbon. The water containing sulphuric acid enters, on the contrary, through the tube communicating with the zinc compartment, and being rendered denser through the formation of zinc sulphate, flows off through a syphon tube. The level of the liquids is not very different, but that of the sulphuric acid water is a little the higher of the two in the external vessel. A section of a glass tube bent into a circle is arranged at the upper part of the liquid, where it is warmest. This tube is traversed by a current of cold water, in order to keep the liquid at a constant temperature. One of the two tubes entering the bottom of the jar serves to empty the liquid contents, and is always kept corked when the battery is in operation. All the communications are established by mercurial contacts. The zinc cylinder is connected with a strip of copper contained in a glass tube that traverses the cover, and which dips into the mercury in the gutta-percha trough. The square end of the carbon is hollowed out and the cavity is filled with mercury, which serves to establish communiaction with the external circuit.

Calorimeter Tests for Temperatures.

In many cases where temperatures below the melting point of wrought iron are to be determined the following method will be found convenient and accurate: A small bar of iron weighing from 1 to 5 pounds is suspended in a flue or fire-box, and is allowed to take the temperature of the surrounding gases. The length of time necessary for exposure naturally varies and should be determined experimentally for any particular case. Suppose three bars of the same weight and similarly disposed in a flue are allowed to remain two and one-half minutes, five minutes and ten minutes respectively, the condition of the fire remaining practically unchanged. Then, if the resulting temperatures are substantially alike, the shorter period of time is sufficient to acquire the full temperature of the hot gas; if the two other bars only are alike in temperature, then five minutes will be sufficient. If, however, the ten-minute bar shows the greatest temperature, then further tests with ten minutes as a mean are required. In making a preliminary test the ten-minute bar should first be introduced; five minutes later the five-minute bar, and two and one-half minutes after that the last bar. In other words, the bars should leave the flue or fire-box at the same time. After having thus found the time necessary to acquire the furnace temperature, the operation consists simply in cooling down the bars (respectively) in a known weight of water, noting the temperature of the water before the bar is dropped into it, and after the bar and water have assumed the same temperature. Several bars are used only to insure greater accuracy in the result. Having reached this point we proceed as follows: Let w = weight of bar when it enters the water; W = weight of water heated; T = initial temperature of water, and T_1 = final temperature of water and iron; S = the specific heat of water at temperature T; S_1 = specific heat of water at temperature T_1, and S_2 the specific heat of iron, which may be taken as equal to .1138. Then if we make $R = T_1 S_1 - T S$ and $H = \frac{W R}{w}$, the temperature T_2 of the iron bar, and, consequently, of the hot gases, is $\frac{H}{S_2} + T_1$. This method is in many cases preferred to the application of an expansion pyrometer, and for temperatures above 3000° F. platinum may be substituted for iron, the specific heat of which, according to Pouillet, is .0382.

A New Illuminant.

Lieutenant Diek, of the Russian Army, is said to have discovered a new illuminating substance which is capable of imparting luminous properties to objects to which it is applied. It is in the form of a powder and of three colors, green, yellow and violet, the latter being the most powerful. Water in a glass vessel is by this means converted into an illuminating fluid. In a lecture recently delivered by the inventor at the Nicolai Engineering Academy, at St. Petersburg, he explained the application of the substance to military and industrial mining operations. The illuminating power lasts for eight hours, and the powder must then be renewed. The German Government is said to have lately been making experiments with Lieutenant Diek's invention.

A New Fuel.

A Mexican paper gives an account of a new fuel recently brought out in the City of Mexico. The article is called "turbato," and consists principally of bog peat, of which there are immense quantities in Mexico, mixed with a proper proportion of bitumen. The fuel is made for locomotives, stationary engines, smelting purposes, smiths' fires and household purposes. It is said to burn freely and without much smoke, giving a higher dynamic equivalent of heat than the same amount of wood. It can be manufactured and sold in Mexico at a price considerably below coal or wood, and, looking at the daily increasing demand for fuel, the augmentation in the price of wood and its growing scarcity, a large and successful market is considered in store for "turbato."

Spontaneous Combustion of Coal.

Referring to the above subject, which has received attention at different times, it may be of interest to state that, according to one authority, the spontaneous ignition is due to the presence of pyrites, which, on oxidation under suitable conditions, sets fire to the coal in which it is imbedded. According to Fayol's experiments, however, the real cause of this phenomenon is the oxidation of the coal itself and not of the pyrites. The absorption of oxygen by coal—carbon—takes place more or less readily according to the temperature and the coal being more or less finely divided. According to the *Journal* of the Society of Chemical Industry, England, lignite in the state of fine dust takes fire at 150°, gas carbon at 200°, coke at 250° and anthracite at 300° or above. On heating a mixture of finely-powdered coal and pyrites to 200° for four days the coal took up 6 per cent. of oxygen, while the pyrites absorbed only 3.5 per cent. Hence coal absorbs oxygen much more energetically than pyrites, which has also been confirmed by the following experiment: About 900 grams of powdered coal and 3350 grams of powdered pyrites were placed in tin cans and put in a drying chamber. Up to 135 both behaved similarly, but from there the temperature of the pyrites remained almost stationary, while that of the coal quickly rose, ignition taking place after a few hours. Two other samples of coal and pyrites were put in a chamber at 200°. The temperature of the coal quickly increased. After 40 minutes it got up to 200°, and the coal took fire, while the pyrites had at the same time only been raised to 150°. The ignition of the coal was, it is stated, not at all hastened by an admixture of pyrites.

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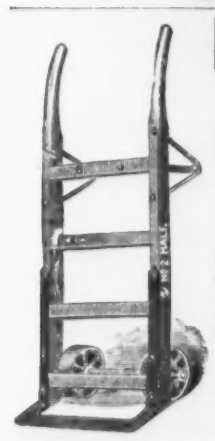

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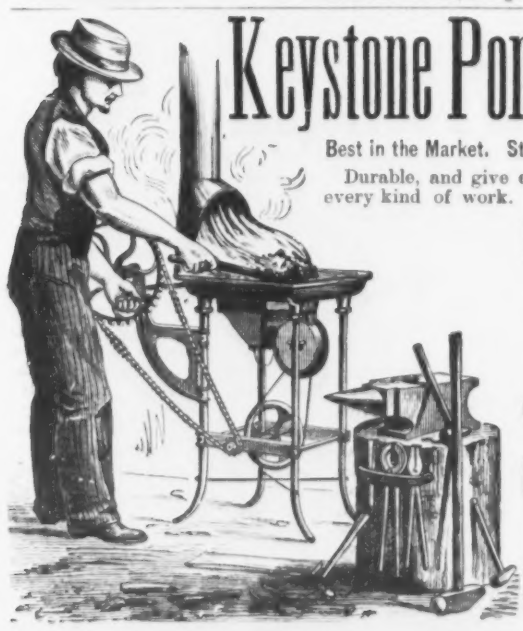

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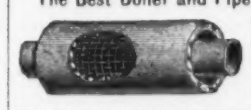

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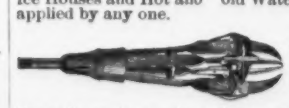

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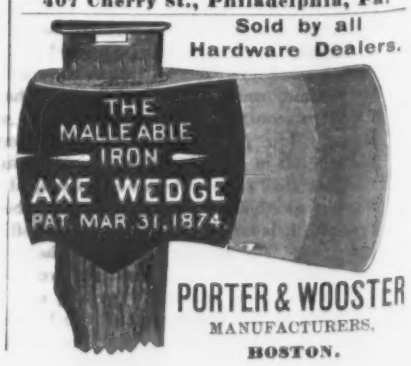

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Bartholdi's Statue.

A foreign correspondent of one of the daily papers, referring to the Statue of Liberty for the harbor of New York, writes as follows:

At Paris I found the papers and the people taking great interest in the reported progress of the subscriptions for the pedestal of Bartholdi's Statue of Liberty. Frenchmen had been really pained by the tardy responses of Americans on this subject. Now they are cheered when they learn there is a better prospect of raising the pedestal fund. Thinking you would like to know the actual condition of the truly great work, I visited Bartholdi's *atelier*. You are familiar with the figures of its dimensions. But numerals and verbal descriptions, however precise, give you no true idea of the colossal grandeur of the image. It is now all complete but the head and a part of the left arm, which holds the tablet. This headless effigy towers aloft to the hight of the average New England church. I saw the workmen in the act of finishing the face. It is of imperial beauty. The expression is grave, but sweet. Even on a close view, one can grasp its subtle charm forgetful of its gigantic proportions. What say you to a woman whose lips arch in a cupid's bow 3 or 4 feet long? The *coiffure* or chignon which will adorn the shapely head is as big as a Broadway stage. The curls that grace her fair cheeks are of the size of barrels. Everything is on this scale of magnitude. The toe that peeps out from the hem of her flowing robe would seat three or four people. As you know, the material of the statue is pure sheet copper, about ⅛ inch thick. This is hammered into the requisite shapes for the several parts of the figure and then bolted together. At a little distance the seams and rivets do not show, the whole appearing like a solid single casting. After a little exposure to the elements the bright red copper assumes a rich dark hue far superior to that of any bronze. M. Bartholdi expects to have Liberty ready for shipment to New York in two months. The pieces, some hundreds in number, are now only hemstitched (so to say) as they are combined in his yard. They can be easily taken apart, and will be fully riveted only when they are rejoined on the summit of the pedestal which awaits its lovely mistress on Bedloe's Island.

Cable Street Railways.

Referring to the above subject, the Chicago *Railway Age* remarks that as the construction of wire-cable street railways is now being agitated in a number of cities in the United States, a brief history of the cable railway, with some figures as to cost of construction and operation, as compared with the horse system, will be of interest. The cable street railway is the invention of Mr. A. S. Hallidie, and was first put in use by the Clay Street Hill Railroad Company, in the city of San Francisco, in the year 1873. After this line had been in operation for three and a half years the Sutter Street Railroad Company, of the same city, whose lines had been worked unprofitably for years by horses, changed from a horse road to the wire-cable system. This road, which is three miles long, is 5 feet gauge, and its greatest elevation is 167 feet above its initial point. The California Street Railroad commenced running in 1878, and that of Geary street in 1880. All of these roads have been extended since first built, so that now San Francisco has 50 miles of the cable system in operation.

Chicago was the next city to try the experiment, and she now has 20 miles of cable road, which has been successfully operated for over a year. The cable system is also in operation on the great East River Bridge, which connects the cities of New York and Brooklyn, the first trip having been made on the 18th of the past month. With this exception, Chicago and San Francisco are the only cities in the United States that have the cable system in use. A company has recently been organized in Philadelphia, for the purpose of introducing the system in that city, and the subject is being strongly agitated in other cities.

The cost of building a cable road varies from $40,000 to $125,000 per mile, owing to the style of construction, kind of soil, grades, &c. In Chicago it was about $115,000 per mile. Owing to the severe winter and heavy snows, the tube in which the cable runs was made over 4 feet in depth, and the cable was placed about 30 inches above the bottom of the tube, to allow for the accumulation of light snow which might drift in through the narrow slit in the top of the tube. The foundation for the road-bed and tube was quite soft and yielding, and, consequently, needed a broad base of concrete to sustain the superstructure; hence the heavy expense of construction. In San Francisco the cost was much lighter. The cost of constructing 3 miles of road in that city was $155,698, to which should be added $86,080 for equipping the road. This includes engines, boilers, driving machinery, 15 cars, the same number of dummies, buildings, &c., and makes the cost of the double-track road, ready for operation, $241,788. The expense of operating a cable road is estimated at from 50 to 60 per cent. of what it costs to operate a horse railway. The average expense of operating a horse railway 3 miles in length, double track, with a speed of 4½ miles per hour, with 82 cars and headway of 2½ minutes, is estimated at $138,880 per annum, exclusive of administration of office, while the annual running expenses of a double-track cable road of the same length, with a speed of 6 miles per hour, with 24 cars and 24 dummies, leaving every 2½ minutes, is only $88,246, showing a saving of $50,634 per annum, or 36.46 per cent.

The running expense of a cable road 3 miles in length, having 12 cars and 12 dummies, seating 44 passengers to each car and dummy, the speed being 6 miles per hour, and the headway 5 minutes, is (estimated) $59,085, which, compared with a horse road of the same length with 32 cars, each seating 22 passengers, the speed being 4½ miles per hour and the headway 2½ minutes, at an estimated cost of $138,880, shows a saving in the year's expenses of $79,794, or 57.45 per cent. It will thus be seen that while the expense of constructing a cable road may be much heavier than that of a road to be operated by horses, the saving in the cost of operation, as compared with the horse system, is so large that it will require no very great period of time for a cable road to pay for the difference in the cost of construction out of its increased net earnings, and the wire-cable system will, doubtless, before many years be in general use in all the large cities throughout the United States. But for small towns, where short and infrequent runs are made, and only single tracks are in use, the cable system will probably never be adopted to any great extent, because in such places the extra cost of the track and plant would not be met by the saving in running expenses.

Reforms in the Glass Trade.

Mr. John O'Leary, who was one of the secretaries of the Window Glass Manufacturers' Convention, held in Chicago on August 29, said recently that the action of the convention in adhering to the demand for a reduction of wages was unanimous, and that every person present was determined to enforce that reduction. "In proof of this," said he, "is the fact that our entire session lasted only from 10 o'clock in the morning until 2 in the afternoon. Each member signed an agreement pledging himself not to start his factory until the conditions are complied with. The reduction of wages is not the question upon which we intend to make the main fight. The workmen will be compelled to rescind their rule under which blowers are allowed to make only 48 boxes of glass per week. The capacity of a pot is 60 boxes per week, and it costs us just as much to melt the pot out of which only 40 boxes are taken as it does to melt the pot which nets us 60 boxes. There is a considerable loss, for the glass remaining has to be taken out of the pot and returned the next day, thus making the manufacturer pay half a dozen times for melting the same glass. Another matter on which we will make a fight is the question of 'spare' pots—that is, the pots left standing full of glass by a blower who does not choose to come to work on that day. The manufacturers must pay extra for having it dipped out on the floor in order that all the pots may be given the same degree of heat the next day. These abuses must be remedied, and we are determined that they shall be remedied. The men have become so bound up by the rules of their association that we are compelled to go into a struggle with that power, and they may rest assured that we go into it to win. The reduction that we propose does not amount to more than 5 per cent., while the changes in the tariff have reduced the duty on glass 25 cents per 100 feet. We understand that it was the intention of the workmen to ask that all distinction in reference to quality be abolished; in other words, that we be made to pay as much for second-rate glass as we do for the best. We must have the power of the association restricted, or the members must become more reasonable. The entire body of glass manufacturers are fully determined to have a change made in many usages about the factories. We meet the workmen again on September 20, and if they do not accept our terms by that time, then comes foreign labor, as we can do nothing else." The workmen laugh at the foreign-labor threat. They say it has been tried before and has proved a very expensive failure. No person expects anything now but a long strike. The last battle, several years ago, lasted more than 12 months.

The London *Mining Journal* directs attention to an unusual occurrence which recently took place at a colliery during a thunderstorm. "The electric fluid," says our contemporary, "seemed to strike the west winding rope of the west shaft in its elevated position upon the pulley. One current passed down into the winding engine-house, where it was seen to flash up and down the feed pump below the level of the floor, and quite illuminated the place at the time; another current passed down the rope to the bottom of the shaft, a depth of 35 fathoms, striking the cage, which fortunately was standing upon the bottom at the time, a ball of fire falling upon the iron flat sheets at the bottom. The shaft is fitted up with round wire rope guides for two cages; these guides are suspended from the top of the pulley frames or head gearing, and secured at the bottom by heavily-weighted levers. These iron rope guides would probably act as lightning conductors and thus lessen the shock of any excess of electric fluid by carrying it off into the sump. Had the cages been running in the shaft at the time, and the shaft fitted up with the usual wooden guides, serious damage might have been caused."

Official advices from Mr. Foote, the newly-appointed United States Minister to Corea, state that he has taken up his residence in the capital of that little known country, but that life there is attended with many discomforts and privations. The only house he has been able to obtain is a rude one of wood and paper, with paper windows, and is situated in an undesirable location, in the midst of hovels and filth. The climate is one marked by great extremes of heat and cold, and everything in the shape of food, except the simplest necessaries of life, has to be brought from abroad.

The Sultan of Turkey is defeated in a suit brought against the Providence Tool Company, designed to recover the value of about 50,000 rifles manufactured on the order of the Turkish Government, but never delivered, on account of some alleged failure in payment. The case was argued before Judge Blatchford, of the United States Court, in June last. Upon an application for an injunction to compel the company to fulfill its contract, and to prohibit it from disposing of the rifles to any one else, the injunction was denied and the restraining order was vacated.

The annual report from the Fourth Lighthouse District, including parts of New Jersey, Delaware and Maryland, announces that the new lighthouse on Fourteen Foot Bank will stand in from 20 to 22 feet of water at low tide. The design is for a cast-iron cylinder, 35 feet in diameter, sunk not to exceed 23 feet into the sand, and rising 30 feet above low water, to be surrounded by an iron structure giving room for a keeper's dwelling and a steam fog signal. It is expected that the lighthouse will be completed during the coming season.

Mechanical Puddling.*

BY J. G. DANKS.

My purpose in this paper is not to treat on the science of puddling generally, but merely to sketch the history of mechanical puddling, the difficulties encountered, and the manner in which they have been overcome. It is necessary first to describe briefly the old or hand system of puddling, as it may assist in understanding the difficulties to be met in performing the work by machinery. Puddling is the process in most general use for converting cast into wrought iron, by first melting, and then agitating the metal while kept at a high temperature, in which operation it is deprived of its carbon, silicon and other impurities.

The process was first introduced by Henry Cort, in England, in the year 1780. In partnership with Samuel Jellico, at Fontley, in Southampton, he worked out this problem, which was at that time the most important step ever taken toward increasing the quantity and reducing the cost of manufacturing iron. A reverberatory furnace was used, which consisted of a fire-grate, puddling chamber and flue, covered with a fire-brick roof, and separated from each other by bridge walls, which, though high enough to confine the iron and fuel in their respective chambers, allowed a free passage of the burning gases from the fire-grate to the puddling chamber, and thence through the flue to the chimney proper, provided with a damper by which the puddler controlled the temperature of the furnace, and, to some extent, the character of the flame. The bottom and sides of the puddling chamber in Cort's furnace were lined with sand, and, as the removal of silicon is one of the chief objects of the puddling processs, it will be readily seen that one of Cort's worst enemies (sand) was present at all stages of the operation. Notwithstanding this, the advantage of his invention to the manufacturing interests of England may be partly seen by the following figures: The total amount of iron manufactured in 1720 was about 12,000 tons, and at the time of Cort's patent—1780—about 90,000 tons, which in 1820 had increased to 400,000 tons, an increase due almost exclusively to Cort's invention. Although he had added millions of pounds sterling to the wealth of the Kingdom, and opened the way for the employment of hundreds of thousands of men, the only recognition his services received was the empty honor of being a great inventor and the little estate now occupied by his moldering remains in Hampstead churchyard.

The first important improvement subsequently made in puddling was the invention of Samuel B. Rogers, consisting in the substitution of iron plating to the bottom and sides of the puddling chamber, covered to a depth of 10 or 12 inches with a rich oxide of iron, instead of sand. The plates are so constructed as to allow a free circulation of air, to prevent overheating. This oxide bottom not only permits the working of the iron at a much higher temperature than was possible on the sand bottom, but is itself a valuable agent in the removal of the carbon, silicon, phosphorus and other impurities contained in the crude metal. The invention of Rogers was fully as important to the trade as that of Cort, yet the most substantial benefit we hear of his receiving was the nickname of "Old Iron Bottom," by which he was known all over England. But little change has taken place in the process of puddling by hand since the latter invention was introduced, and, although it is, in a scientific point of view, one of the most interesting operations in iron manufacture, it is also the most slavish and exhaustive labor to those engaged in it.

The earliest authentic records I find on mechanical puddling are the patents of Mr. Walker and Mr. Warren, of England, who, in the year 1853, took out a patent for a rotating cylinder lined with fire-brick. The axis of the cylinder was inclined to a horizontal axis of rotation, so that, as it revolved, the fluid metal was caused to flow from one end to the other. I am not aware that they ever built a furnace so as to test their ideas in practice. In 1856, Mr. Samuel Danks (the writer's father) filed a caveat in the United States Patent Office for a revolving puddling furnace, and he had a furnace nearly completed in Mount Savage, Md., when the panic of 1857 caused the abandonment of the work for the time. In 1859, Mr. W. Tooth, of London, England, took out patents for a mechanical puddling furnace, and was given every facility for testing the apparatus by Mr. William Menelaus, of the Dowlais Iron Works, in Wales, where a complete forge was erected, and some good iron is said to have been produced. The lining used in these furnaces was either fire-brick or gannister, and Mr. Menelaus stated that the latter was found to be the best material he had tried. In 1863, Mr. Tooth and a Mr. Yates obtained additional patents for improvements in the process, all of which were tested at the Dowlais Works. In 1867, after having spent upward of $150,000 in experimenting, it was abandoned. Mr. Menelaus, in a paper read before the Institution of Mechanical Engineers, gave a description of their failures, which were mainly due to the want of a good lining for the puddling chamber. Afterward, when showing a number of prominent ironmasters through the Dowlais Works, he pointed to the corner occupied by these furnaces as the "burying ground of mechanical puddling."

It is important to notice that up to this time the only lining used in mechanical puddling was a highly-silicious one (like that used by Mr. Cort in the first introduction of hand puddling), which would be readily dissolved by the molten metal and the oxides with which it was constantly coming in contact. Under these circumstances it was found to be practically impossible to remove the impurities from the metal sufficiently to insure a good fibrous iron. Nor was this all; the character of the lining material was such that, when the iron was formed into a ball, its weight constantly broke the lining down, so that it was proved to be unfit to withstand either the chemical or the mechanical action to which it was of necessity subjected. An attempt was made to use an oxide-of-iron lining in the cylinder, but, from the manner in which it was poured in, it was evidently an oxide too high in silica for the purpose; or, if an oxide of sufficient purity were melted upon an initial lining of silica, sufficient of the latter would be dissolved during the melting to render it worthless. During the time when these experiments were being carried on in England (between 1863 and 1868), Mr. Danks moved to Cincinnati, Ohio, to remodel the old merchant mill on East Front street, and adapt it to the manufacture of iron rails. Here he again revived the question of mechanical puddling, and had obtained patents for a lining which, it was believed, would answer successfully all the requirements of use.

In May, 1868, a small experimental furnace was built, with a capacity of working only about 300 pounds of iron at one charge, being thus limited by the machinery at hand to deal with the iron. Six hand-puddling furnaces were in use in the mill at this time, with the usual complement of workmen, and while the new furnace was approaching completion the comments made by those engaged in the hand process were not encouraging, for they were, with few exceptions, opposed to any attempts to perform their labor by machinery. Briefly, the new furnace consisted, first, of a fireplace about 4 feet square, the outer shell of which was made of iron plates lined with fire-brick. Adjacent to this was the revolving cylinder, about 3 feet long and 4 feet in diameter, with a contracted opening at each end. One end of the cylinder was made to fit close against the fireplace, and the other end provided with an adjustable elbow-piece, forming a tight joint with the cylinder end, and also serving as a connection between the cylinder and the chimney by which the waste gases escaped. The cylinder was mounted on four rollers, the end joints kept tight by a strong iron prop which forced against the shiftable elbow-piece, the latter being also provided with a side prop holding it firmly in position while the furnace was at work. The cylinder ends were kept cool by jets of water. The bridge casting, the bridge and door rings, also the front of the shiftable piece, were kept cool by water circulating through them. The fireplace was provided with a bridge-wall reaching half-way up the opening in the cylinder end, to prevent a mixture of the fuel and iron, but leaving a free passage for the gases through the furnace. The fire-grate was also provided with two blast-pipes, respectively for forcing air underneath and over the fire. The bottom blast entered the ash-pit and found its way up through the burning fuel. The top blast entered an air-space formed over the roof of the furnace, and was admitted to the furnace proper through a finely perforated brick arch, as nearly over the bridge-wall as possible. Each blast-pipe was provided with a valve, under the control of the puddler.

The advantages of forced blast in this form of furnace are many; chief among them are, first, a higher temperature than can be obtained by natural draft; and, second, that a slight pressure of flame may be kept in the furnace, which prevents the entrance of cold air at the cylinder joints, thereby avoiding not only a reduction of the temperature of the furnace, but a waste of iron by oxidation. The cylinder plates were ribbed on the inside, so as to hold the lining, and the machine was rotated by a small steam engine. When everything else was ready, and the cylinder revolved a number of times, the lining was put in. This was done by first mixing pulverized Iron Mountain ore into a stiff mortar with about six times its bulk of thick lime-cream in a grinding mill consisting of a revolving pan and two heavy iron rollers, and with this material covering the ribs of the cylinder plates to the depth of 1 inch, making an average thickness between the ribs of 4 or 5 inches. The lower half of the cylinder was first lined, a good surface being put on it with a trowel, and the whole was then thoroughly dried by building upon it a wood fire. The cylinder was then turned a half revolution and the lining completed and dried. This was called the initial lining, and was only used to protect the plates while the real or working lining was put in. The furnace being now fired up slowly, a quantity of roll-scale or hammer-slag was first melted, so as thoroughly to glaze the initial lining. A large quantity of pulverized ore and some light wrought scrap were now put into the cylinder and melted, the cylinder having been revolved slowly during the melting. After melting, the rotation was stopped and a quantity of dry lumps of ore thrown into the bath, serving the double purpose of presenting a rough surface to assist in agitating the iron, and also to hasten the cooling of the liquid oxide. After hardening sufficiently, a further quantity of ore and scrap was thrown in and melted—this operation being repeated about five times usually completes the lining. The vitreous coating thus formed is very hard, and I never knew of its breaking down after once being cooled, except at the openings at the ends of the cylinder, where it is thin. The lining gradually wears away, but it is easily repaired, and the entire lining need never be taken out unless for some necessary repairs to the plates.

When the furnace was put to the test of puddling iron, the ridicule so lavishly heaped upon it by the men ceased, a lively competition ensued, and it became evident that they had laughed too soon, for the machine had not been in operation many days before it produced seven charges of iron in less time than they could produce six by hand, and required less than one-fourth the amount of manual labor, although employing the same number of men. The quality of the iron was found to be superior in every respect to that made by hand. This furnace was experimented with for some time, and then, with the view of puddling larger heats and still utilizing the old machinery, two larger ones were built, in which the diameter of the cylinders was about the same, but the length increased to about 6 feet, it being the intention to divide the charge into two or more balls. This was attempted by leaving apertures in the cylinder plates, through which pieces of soapstone or other refractory material could be inserted, for the purpose of breaking the iron asunder as the furnace revolved. Large lumps of iron ore were left projecting high above the general level of the lining; cast-iron projections, covered with a thin layer of the initial lining, were inserted, but all gave a good deal of trouble and were finally abandoned as impracticable.

In carefully watching and testing the product of these two furnaces, a much more serious difficulty presented itself. In a cylinder so long in proportion to its diameter, the end next to the fire-grate was always much hotter than the other, and the iron at this end was always the best, thus producing two qualities of iron in each charge. Added to this lack of uniformity (which was not met with in the small furnace) was the labor of separating the iron. There seemed no way left to adapt the system to existing machinery; in fact, experience indicated that the further we departed from the old method of making the iron into a number of small balls, the better would be the results. Accordingly, furnaces were built with cylinders 6 feet in diameter and 4 feet 6 inches long, in which the entire charge was made into one ball. With slight alteration, the old squeezer was made to take these balls of 600 pounds, and the iron was found to be perfectly uniform. The results obtained were so satisfactory that in 1870 the company authorized the removal of all the hand-puddling furnaces as fast as machines could be built to replace them. One result constantly met with was the subject of much unfavorable comment among those who had not investigated the subject. It was the fact that, instead of the usual loss of from 10 or 15 per cent. in weight by hand-puddling, there was a gain of from 5 to 8 per cent.—that is, out of 500 pounds of pig iron charged into the furnace, there was obtained in puddled bars from 525 to 540 pounds. The gain often ran up to 10 per cent., but the figures given will represent a fair average.

I will now describe the operation of puddling by machinery, in which we will find at least a partial solution of the above mentioned seeming impossibility. Puddling is essentially a refining process, and as the refining is best accomplished while the iron is in a fluid state, a gray pig is preferable to a white pig, because it may be kept fluid as long as desired, this property being chiefly due to the amount of silicon it contains. White iron, which usually contains a low percentage of silicon, begins to granulate very soon after melting, unless a large amount of phosphorus is present. The refining agent used in puddling is an oxide of iron, and a quantity of the latter is usually put into the furnace, in the shape of hammer cinder, squeezer cinder or roll-scale, with each charge of iron. As soon as they are melted, the furnace is started to revolve slowly, the iron being covered by a bath of liquid oxide. To facilitate the operation, a small jet of water is now thrown, by means of a rubber hose, upon the descending side of the furnace lining, immediately above the liquid iron. This chills a part of the oxide, which, adhering to the lining, is carried down through the iron, oxidizing the silicon, phosphorus, and such other impurities as the iron may contain, and these become incorporated with the cinders. It is interesting to watch these changes taking place. The iron, which at first was quite fluid and somewhat resembling quicksilver, becomes gradually thicker, until, when the refining is complete, it has entirely lost its silvery appearance and comes to the consistency of thick paste or mortar, its melting temperature having materially increased. The bath of oxide, on the contrary, has become more fluid and its melting temperature decreased. This operation is carried as far as possible without causing ebullition. The temperature is now raised so as to thoroughly liquefy all the oxide, which is now removed from the furnace through a tapping hole. When this is done, the furnace is again put in more rapid motion, so as thoroughly to agitate the iron. Up to this point the iron has retained a large part of its carbon, which is now rapidly oxidized by the lining of the furnace and causes violent ebullition. The iron has now reached the granulated state and occupies five or six times the space it did when fluid. The carbonic oxide gas, produced by a union of the oxygen of the lining and the carbon of the metal, presents a beautiful appearance as it bursts through the surface in many hundred jets of pale blue flame.

When carbon is burned by free oxygen it has no effect in reducing oxide of iron; but when the carbon is oxidized by the solid oxides of the furnace lining, the oxide containing it is reduced to the metallic state and is added to the charge, and as from 300 to 600 pounds of iron ore are used (in the shape of lining) for every ton of iron produced, it must be the iron reduced from this lining which increases the charge and makes it greater than the original weight of pig iron. It is believed by many that silicon has this power to reduce oxide of iron to the metallic state, and it is a fact, well established, that iron containing a high percentage of silicon gives a better yield than iron containing but little silicon, although the carbon in both cases may be the same. The boiling operation usually lasts from 10 to 15 minutes, when the grains of iron unite, forming a spongy mass, which is then removed from the furnace to be squeezed, hammered or rolled into bars, as may be required. There were in 1870 and 1871 three forges built to puddle iron by this method—one each in Chattanooga, Indianapolis and Pittsburgh. In the two former the furnaces and engines were poorly constructed, and, after working for about one year, the defects of building and abuse while working made the repairs so heavy that they were finally abandoned. The plant of 10 furnaces in Pittsburgh is still in successful operation.

In 1871, Mr. Danks visited England, and, by invitation, read a paper before the Iron and Steel Institute, at a meeting held in Dudley, giving a description of his furnace. This resulted in the selection of a commission of three gentlemen to visit Cincinnati and investigate the subject. The scientific part of the inquiry was intrusted to Mr. George J. Snelus (at that time in the employ of the Dowlais Works), the commercial aspect of the system to Mr. John A. Jones (ironmaster, of Middlesbrough), and the practical working to Mr. John Lester (of Wolverhampton). They came over in October, 1871, bringing with them about 40 tons of English pig iron and iron ore, containing good, bad and indifferent qualities, all of which were carefully marked. The lining was all taken out of one furnace and a lining of English material put in. Samples were taken from each brand of pig iron for analysis; also, samples at different stages of the operation during puddling. They weighed all the material used and the iron produced. The examination was a very searching one, and the results fully accorded with our own previous experience. They visited Indianapolis and Chattanooga, where furnaces were at that time in successful operation. (Those in Pittsburgh were not then completed.) I omit reference to their report on account of the length of this paper, which already exceeds the limits of the mere sketch intended. In February, 1872, the first furnace on the Danks system in England was put in operation, at the works of Messrs. Hopkins, Gilkes & Co., in Middlesbrough. Specimens of the iron produced were severely tested, and exhibited at the quarterly meeting of the iron trade. The excitement ran high, and a public invitation was given for the iron trade to visit the works in a body on a certain day to see the furnace in operation. In the meantime, a written contract was entered into with the inventor to pay a certain price for the right to use 200 furnaces; the contract was signed by Mr. Menelaus on behalf of the manufacturers, and the day fixed for payment. But when the day came, it brought disappointment to the inventor, for, through the efforts of one or two members who had been unsuccessful workers upon this same problem, the contract was repudiated. Many members openly condemned this disgraceful proceeding, and four firms obtained licenses to build furnaces which would puddle 1000 pounds at a charge. Two of these firms met with the same fate as their predecessors at Indianapolis and Chattanooga, and from the same cause. I have no recent information as to whether the others are now working; but in 1878, Messrs. Hopkins, Gilkes & Co. produced with their six furnaces over 10,000 tons of machine-puddled iron, on all of which they realized a handsome advance in price over the iron puddled by hand, owing to its superior quality.

Soon after the starting of our first furnace in England, and the practical demonstration of the successful working of the machine, others entered the field, using our lining and cooling advantages without asking permission; among them were Mr. Adam Spencer, of West Hartlepool, and Mr. Crampton, of the Woolwich Arsenal, Mr. Spencer built an immense furnace, the cylinder of which was about 10 feet long, and in which he worked one ton of iron at each charge. He met with the same trouble we had found in the long cylinder, and, failing to obtain a uniform result, soon abandoned it. Mr. Crampton made a new departure in trying to adapt pulverized fuel to the revolving furnace, in 1872. His furnace was a long cylinder with a water jacket, the shell being made double, and a large stream of water circulating through it. The cylinder was divided into two compartments—one of which was intended as a combustion and the other as a puddling chamber. This evidently did not give good results, as the double cylinder was soon replaced by a short single one, and the fuel blown directly into the puddling chamber. The heat obtained is said to have been very intense, but the foreign matter in the fuel impaired the quality of the iron to such a degree that it had to be discontinued. Dr. C. W. Siemens has used the revolving furnace extensively for the manufacture of iron direct from the ore. A description of the process would unduly lengthen this paper.

On March 5, 1872, William Sellers, of Philadelphia, obtained patents for a revolving puddling furnace, in which one end of the cylinder was entirely closed, and the gases made to enter and leave through different flues at the open end. The closed end of the cylinder was provided with a large trunnion, by which its rotation was effected and also part of the weight carried, instead of a shiftable flue, by the removal of which access was had to the cylinder. The cylinder and engines were mounted on a pivoted frame, and could be turned at a right angle from their working position. I have no information as to the results obtained with this furnace, but believe none of them are now in operation. The report of the English commission made plain the fact that iron of an inferior quality could be rendered sufficiently pure by the process of mechanical puddling to be used in the open-hearth steel process, instead of the expensive charcoal bloom now used. Nothing of importance was done in that direction (in this country, at least) until about one year since, when the Otis Iron and Steel Company, of Cleveland, took up the matter under the direction of Mr. Samuel T. Wellman, superintendent of their works. Their scientific man and also a practical ironworker were sent to Cincinnati, where our furnaces were at work. Samples were taken back for analysis, and soon after they purchased the right to build a furnace capable of puddling one ton at each charge. The cylinder of the furnace is built of steel plates strongly riveted together, and is 6 feet 6 inches in diameter and same length. The fire-grate is fitted with our automatic stoker. The furnace has been in operation about six months, and the product put into steel with such favorable results that others are now in process of erection.

It would require a large volume to record all the perplexing problems that have presented themselves to those engaged in perfecting this system. The point which perhaps gave most trouble was the abrasion ring at each end of the cylinder. These rings are not only subjected to a good deal of friction as the cylinder revolves, but also to unequal expansion and contraction. It was important that they should be kept cool, and if the workman neglected to keep water turned on, they became hot, and, in cooling, became cracked, so that if a large stream of water was turned on, part of it ran into the furnace. The requirements of the case called for a ring which should stand the friction without wearing too fast, and be of such material as would stand repeated heating and cooling, and constructed in such a manner that no matter how much water was turned on, it could not get into the furnace. About 25 different modifications were tried, both in wrought and cast iron, and considerable time was required to test their respective merits. The ends of the first cylinders were straight-faced instead of conical, and when the furnaces were cooled down on Saturdays, the lining was found to have a number of cracks varying from 1/8 to 3/16 inch in width, due to shrinkage. During the repairs to the brickwork, these cracks became filled with fine dust; and when the furnace was heated again they could not close up, and the expansive force was sufficient to break the cylinder plates, though they were provided with heavy wrought-iron bolts and bands. This suggested the conical ends, which were found effectually to remedy the difficulty. So, indeed, it might be said of nearly every detail of the present mechanical puddling furnace—all have been suggested by experience, and, although many of the furnaces first started have been discontinued, the work of the past 10 years has not been in vain, for progress, though necessarily slow, has been sure, and it may be safely affirmed that the mechanical puddling furnace of to-day is not only a durable, but an economical, machine.

The full benefits of mechanical puddling will not be realized until it has almost entirely abolished the present plan of making pig iron for mill purposes. The fluid metal will be taken directly from the blast furnace to the puddling machines, where it may be worked in charges of one ton each, and the spongy ball, after having been squeezed into a compact bloom, say, of 15 inches diameter, taken directly from the squeezer to a powerful universal mill, and either reduced to a bar from 10 to 15 inches wide and 1 inch thick, or, if desired, made into a square billet of any size down to 5 or 6 inches; the bars cut and piled in lengths required for different purposes; the billets sheared and taken, while hot, to a heating furnace, where, with a wash-heat, they may be rolled into any small sections required, without the intermediate process of piling, or having been allowed to cool, in one continuous process from the time the ore is first heated until it is bar iron ready for market. Working under such conditions as these, a product of 10 or 12 tons can be relied upon from each machine every 12 hours (instead of 1½ tons made by hand), and of a quality far superior to that produced by the old system.

*Read before the Section of Mechanics and Engineering of the Ohio Mechanics' Institute, February 27, 1883.

A Canal Through Palestine.

At a meeting of the London Balloon Society, Captain Molesworth, R. N., delivered a lecture upon the subject of the proposed Jordan Canal. The idea was, he said, to cut the canal 25 miles from Acre to the valley of the Jordan. It would be about 33 feet deep, so as to accommodate the largest ship. It would, moreover, be about 200 feet wide, which would be sufficient to allow vessels to pass each other. There would be no necessity for locks, because, when the water was let in, the water of the Dead Sea and the Mediterranean would practically flow on the same level to the Akaba Gulf of the Red Sea. The cutting of the canal seemed to present no great engineering difficulties. A company had been got up, and that company spoke of the expense as about £8,000,000, but if it could be carried out for £20,000,000 the advantage would still be largely in favor of the ship owner. Some discussion followed, in the course of which doubt was expressed as to the financial success of the scheme, owing mainly to the fact that if carried out it would flood many miles of valuable fertile land on either side of the river. The general opinion was in favor of the canal, and ultimately the following resolution was adopted: "That, in the opinion of this meeting, the canal which is proposed from the Mediterranean through the River Jordan and the Dead Sea to the Gulf of Akaba is absolutely necessary for the growing commerce between the Eastern and Western nations of this hemisphere." The Constantinople correspondent of the *Standard* says that Admiral Sir Edward Inglefield, who is now in the Turkish capital to represent the interests of the English syndicate for cutting a channel for a waterway through Palestine, has had a very favorable reception at the palace, for which Musurus Pacha had paved the way by his warm recommendations of the scheme. The Sultan, it is said, views with favor the project in question, which, by opening up a water passage into the Red Sea, would render Turkey independent of the Suez Canal, over which His Majesty now exercises only the most nominal control.

The large tunnel under Jones & Laughlin's Iron Works, at Pittsburgh, was recently completed. It was constructed by the Vanderbilt Pittsburgh, McKeesport and Youghiogheny Railroad, and is some 1650 feet long. Its cost will be $500,000. Over 600 men were employed on it for a year. The tunnel is one of the engineering feats of the day. The roof is only a few feet below the top of the mill floor, where massive rolls, hammers and hundreds of men were working. The mill is the largest single mill in the United States, and none of the buildings were injured, and work was not delayed an hour. The ground through which the tunnel passes was mill cinder and slag. For over 100 feet the slag was so hard that it could not be blasted. Heavy weights were dropped on it, and the broken pieces buried in holes where they fell, as they could not be moved, the masses were so large. The road opened for a distance of 60 miles on Sunday for freight traffic.

The craze for ship canals still continues unabated. The last canal proposed is a waterway through Palestine, from Acre, on the Mediterranean, to Akabah, on the Red Sea. This is to be in opposition to the De Lesseps Suez canal and the proposed new Suez canal. In order to make the Palestine canal, it is proposed to have a canal, 25 miles in length, from Haifa, in the Bay of Acre, through the plains of Ashdraelon, to the valley of the River Jordan; this canal is to be 200 feet wide and 40 feet deep; thence the route will be to the Dead Sea, and the latter will be connected with the Red Sea by a canal 20 miles in length, from the head of the Gulf of Akabah. This is the proposition, but whether it will be carried out will no doubt depend upon the manner in which the public will receive the scheme.

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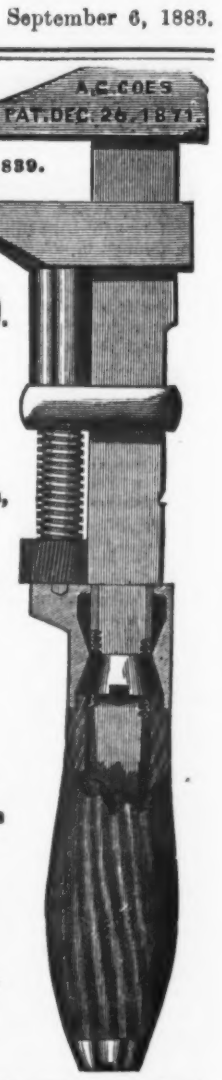

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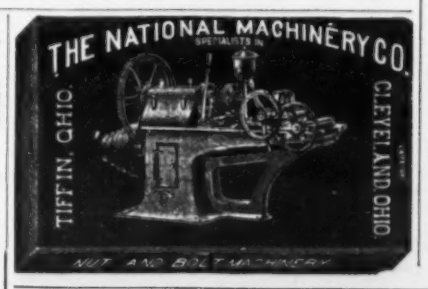

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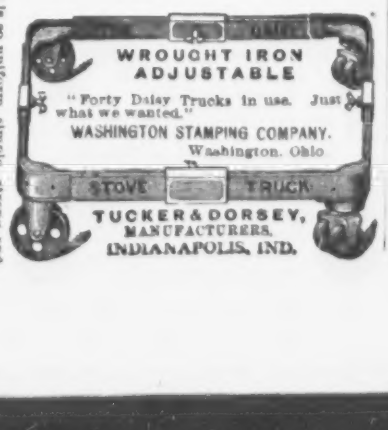

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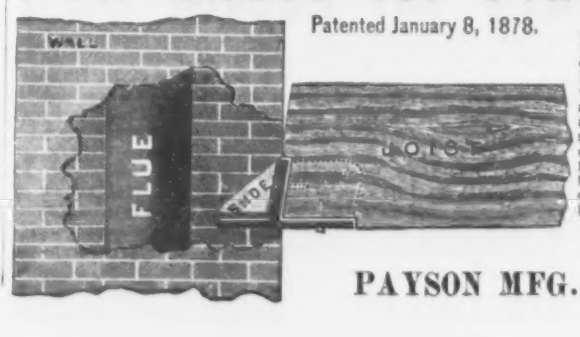

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The Panama Canal.

In an interesting account relating to the Panama Canal, *Engineering* states that the first consideration which presented itself, when the scheme was to be put into execution, was the choice of a port, adapted both for the disembarkation of the plant and stores required for the works, and for the residence or the population which would necessarily collect there. Colon was naturally fixed upon, being the point of arrival of the regular steamers, and the terminus of the railway across the isthmus, and having, besides, good wharfage. On examination, however, these advantages for the most part disappeared. The steamboats, with fixed times of arrival and departure, could not hold themselves at the service of the canal company, the railway company threw difficulties in the way of co-operation, and the wharves were already appropriated. Moreover, Colon is the most unhealthy situation on the isthmus, the town being built on the Isle of Manzanillo, the interior of which is a stagnant marsh. It was not therefore surprising that it was proposed to abandon Colon, and form a fluvial port, instead, at Gatun, on the River Chagres. In pursuance of this idea, Lesseps City was commenced; but the bad accommodation, which was all that the pioneer workmen could obtain, exposed them to malarial fevers, and the result was an amount of sickness and a mortality that produced a panic, and caused the abandonment of the unfortunate "city," which had been founded with so much *éclat*.

Thus thrown back upon Colon, the company decided to create a port of their own there by embanking and filling up a stretch of the marshy shore on the southwest side of the Isle of Manzanillo, along the entrance to the future canal, and terminating just opposite the mouth of Folk's River. The harbor at this point was to be deepened, and protected at the seaside by a mole thrown out into the Bay of Simon. The whole embankment has been named after Christopher Columbus. The execution of this gigantic work is occupying all the energies of the Colon section About 458,000 cubic yards of ballast were required, and it was unfortunately impossible to obtain these from the dredgings of the harbor, as the latter consist almost entirely of slime, or living madrepores, which (for sanitary reasons) it would be out of the question to expose to the sun in large quantities. The material, therefore, had to be obtained from some low hills at a distance of a little over two miles. This part of the work is nearly completed, and 74 acres are now reclaimed partly from the marsh and partly from the sea, and faced toward the harbor by a wall of masonry going down to a depth of 26 feet. For this, stone was necessary, and this has been obtained from another cutting opened at Kenny's Bluff, on the opposite side of the bay, the stone being brought across in barges. In the course of quarrying at this point a spring of drinkable water was discovered, which was a great piece of good fortune, as Colon is entirely unprovided with this necessary of life. When the embankment is completed the quays will be 3000 feet long, and the mole which shelters them will be 656 feet long, and (on an average) 377 feet wide. One covered wharf is now ready for use.

The makeshift condition of all arrangements before the commencement and pending the completion of the Christopher Columbus embankment, entailed in the earlier stages of the work immense additional labor on all concerned, a fatigue which cost the life of the first engineer, M. Etienne. At present matters are gradually coming into order, but the necessity of utilizing every spot of firm ground as fast as it is formed (irrespective of the final plan for the position of dwellings, establishments, railway lines, &c.) must for some time still cause inconvenience and frequent alterations. A double row of houses, for employees, has been erected along the embankment, and named Charles de Lesseps street, and, as they are built upon wholesome soil and open to the sea breezes, they are expected to be healthy. The dredging of the harbor has not made much progress, as little work could be done until the mole was sufficiently advanced to afford shelter to the dredgers, and at the time of writing the marine dredger supplied by Lobnitz, of Garelock, had only just arrived, and was not yet in action. Great results are expected from this machine, which is 180 feet long, 25 feet wide and 11 feet deep. The engines (one of which drives the chain buckets, and the other the screw) are of 250 horse-power, and the dredger safely crossed the Atlantic by herself. A similar dredger is to be dispatched from the same establishment to Panama, and the task of those who have to take her round the Horn is not to be envied. The bay off the embankment has already been so far deepened that there is a free channel up to the mouth of the canal. At this point the work is taken up by a firm of American contractors, who have undertaken to excavate the canal as far as Gatun.

Turning now to the other or Pacific end of the canal, we find the principal offices of the company are located in a building which was formerly the Grand Hotel of Panama and was bought for $200,000. On April 1 the actual number of the staff was: Workmen employed on the line, 6158; agents engaged on the Isthmus, 150; and agents contracted for in France, 161; or a total of 6469. The laborers are Colombians, Martinicans and Jamaicans, the latter outnumbering the two former in the proportion of 4500 to 1658. At present 600 workmen are employed in the neighborhood of the offices, building roads, laying out gardens, leveling mounds and the like, and it is expected that such work, together with the erection of the central stables and central hospital, will be completed at the end of this year. The contract for the first section on the Pacific side, from Pedro Miguel to Rio Grande, has been let to the Franco-American Trading Company, who have not as yet commenced work. Their machinery is being completed in the United States, and they are supposed to put the dredges in motion in July. The quantities of material to be removed will amount to 3,816,000 c. m., and the price to be paid is 28 cents the cubic meter for earth, with special rates for rock. The contractors are to hand over their portion of the canal, completed, in two years, at a cost of about $1,200,000.

In the next section of Paraiso a large amount of preliminary work has been accomplished in the way of workshops, stores, offices and cottages, there being 415 laborers engaged in this way. The actual excavation is expected to begin in November, and in the meantime care is being taken to provide sufficient and healthy shelter for the men, the plan adopted being to build the huts on four posts and thatch them with palm leaves, so that there shall be ample ventilation both below and above. In the summit section of Culebra, all the machinery has been erected on the spot by English and American mechanics. The excavators, ten in number, are of American manufacture, being of the Otis and Osgood types. There are also on the ground 10 locomotives, 300 wagons, several cranes and steam pumps, 450 tons of steel rails, two portable engines, 100 Decauville wagons, and somewhat over a mile of rails. The excavator tracks are nearly all laid down, and many sidings for trucks connecting with the main line of the Panama Railway are completed. The laborers number nearly 700. The contract amounts to 3,500,000 c. m., at 60 cents per meter for the first million, and 55 cents for the remainder, the total cost, with rock blasting, being $2,250,000.

The next section, that of Emperador, reveals the most substantial progress of any. A convenient town has been built in the French style, and there have been laid about 41 miles of rails, 7000 sleepers for excavators, 25,000 for ordinary track and 50 switches and crossings. Already 12 excavators, two engines, eight cranes and 400 wagons are ready for work, and 100,000 c. m. of earth have been removed. The total amount included in the contract for this section is 3,000,000 c. m., the price being $1.75 for the first 500,000, $1.15 for the next 1,800,000 and 90 cents for the remaining 700,000, or $3,575,000 in all. The principal feature of the work in the next section is the building of a railway to the barrage of the River Chagres; all stone and earth excavated at this section will be conveyed to Gamboa by rail, to build the dam between the Cerro Cruz and Cerro Obispo. The barrage is to be constructed between these two hills, terminating at each end in the sides of the Cerros. Its length is 2600 feet, and its hight 100 feet, while its capacity is 660,000,000 c. m. This reservoir is intended to catch the storm water, and so prevent it from scouring out the channel of the canal. The greatest rainfall hitherto noted has been 80 c. m. in a month, which would give 720,000,000 c. m. of water, and hence the greatest rise would never be able to overflow or even fill the barrage. There are 430 men at work on this portion of the undertaking.

In the next section of Gorgona the excavation track has been laid and many sidings completed. The canal cuts the Chagres five times, and sometimes follows its bed when the curves are not sharp. The same thing occurs at fifteen different places in the next two sections of San Pablo and Bohio Soldado, in each of which some of the preliminary work has been done. The remainder of the cutting toward Colon is to be effected, as already explained, by dredgers, which are expected to get to work in a short time, and as the ground is soft and marshy there is no great difficulty to be apprehended. Of the vast quantity of material required for the whole work, only a portion has yet been received. Of sixty locomotives ordered in Europe, twenty were at work at the beginning of the year, and twenty-seven have since been dispatched to the Isthmus. About 2000 railway trucks, landing places, &c., were ordered; 600 of these only have been received, and most of them are in use. Of fifty Couvreux excavators, only eighteen have arrived: but the ground is not everywhere cleared, so as to enable them to set to work. The service of dredgers, barges, tugs and other vessels appears to be complete. Three repairing shops are being established—one at Colon, another at Gorgona, toward the middle of the Isthmus, and the third on the Pacific slope.

Although considerable sickness prevailed some time since, the cases of illness are now reported to have fallen to 14.30 per cent. and the mortality to 2.5 per cent. The prevailing complaints are yellow, malignant, intermittent, remittent, billious and marsh fevers, dysentery, phthisis and pneumonia—a sufficiently formidable list to deter any reasonable person from joining the enterprise except under very special inducements. When, however, the hospitals and the dwellings are completed and the laborers have learned to take precautions against chills and exposure to malaria, it may be expected that the difficulties arising from sickness will cease to be as formidable as they have hitherto proved themselves to be. The labor question still remains unsolved; 6000 men are now employed upon mere preliminaries, and the simple list of the machinery which has been ordered reveals what large extra gangs will be needed to deal with the enormous masses of material which the excavators and other apparatus, if efficiently handled, may be expected to remove daily. When the material to be dealt with is reckoned in millions of cubic meters, as it is in several of the sections, 500 or 600 men will avail but little, especially when it is remembered how much the effective number will be lessened when mechanics, clerks, storekeepers, cooks and the like, have been deducted.

The Supervising Inspector-General of the Steam Vessels reports that during the fiscal year ended June 30, 1883, the total number of accidents on river steamers resulting in loss of life was 34, of which 12 were from explosions, 5 from fire, 11 from collisions and 6 from snags, wrecks and sinking. The total number of lives lost by accidents from various causes during the year was 284, of which 69 were from explosion or accidental escape of steam, 82 from collisions, 45 from fires, 50 from wrecks or foundering, 31 from accidental drowning, and 5 from other causes. As compared with the previous fiscal year, the number of accidents to steamers was less, while the loss of life was greater. Total number of accidents to steamers resulting in loss of life in 1882, 41; do. in 1883, 34: decrease, 7. Total number of lives lost in 1882, 205; do. in 1883, 284; increase, 79. The main increase occurred in accidents caused by collisions.

The Cause of Evident Magnetism in Iron, Steel, and Other Magnetic Metals.*

BY PROF. D. E. HUGHES, F. R. S.

The extreme sensitiveness of the induction balance to all molecular changes in the structure of metals was remarked in my first paper on this subject to the Royal Society,† and in the case of iron and steel it is most remarkable, as the addition or subtraction of $\frac{1}{5000000}$ part, or the addition of the smallest iron filing, to an already large balanced mass of iron is at once rendered evident and measurable. Possessing such an invaluable instrument of research, I was desirous of investigating the molecular construction of iron and steel, but at once I met with a difficulty, viz., that magnetism itself completely changed the character of any piece of iron under investigation. Consequently, finding no help or explanation of the effects produced from any accepted theories of magnetism, I was forced to investigate, by means of the induction balance, the whole question of magnetism as existing in the interior of a magnet, and to determine the particular structure for each case, such as neutrality and polarity. In a recent paper to the Royal Society, upon the theory of magnetism,‡ I described the use of and demonstrations obtained by the induction balance. In this paper I propose to confine myself to demonstrations that can be repeated without it, and whose effects can be observed by the aid of ordinary magnetic direction needles. That magnetism is of a molecular nature has long been accepted, for it is evident that, no matter how much we divide a magnet, we still have its two poles in each separate portion; consequently, we can easily imagine this division carried so far that we should at last arrive at the molecule itself possessing its two distinctive poles; consequently, all theories of magnetism attempt some explanation of the cause of this molecular polarity, and the reason for apparent neutrality in a mass of iron. Couloumb and Poisson assume that each molecule is a sphere containing two distinct magnetic fluids, which in the state of neutrality are mixed together, but when polarized are separated from each other at opposite sides; and, in order to explain why these fluids are kept apart as in a permanent magnet, they had to assume, again, that each molecule contained a peculiar coercive force, whose functions were to prevent any change or mixing of these fluids when separated.

There is not one experimental evidence to prove the truth of this assumption, and, as regards coercive force, we have direct experimental proof opposing this view, as we know that molecular rigidity or hardness, as in tempered steel, and molecular freedom or softness, as in soft iron, fulfill all the conditions of this assumed coercive force. Ampère's theory, based upon the analogy of electric currents, supposes elementary currents flowing around each molecule, and that in the neutral state these molecules are arranged haphazard in all directions, but that magnetization consists in arranging them symmetrically. The objections to Ampère's theory are numerous. 1 We have no knowledge or experimental proof of any elementary electric currents continually flowing without any expenditure of energy. 2. If we admit the assumption of electric currents around each molecule, the molecule itself would then be electro-magnetic, and the question still remains, What is polarity? Have the supposed electric currents separated the two assumed magnetic fluids contained in the molecule, as in Poisson's theory; or are the electric currents themselves magnetic, independent of the iron molecule? In order to produce the supposed heterogeneous arrangement of neutrality, Ampère's currents would have either to change their position upon the molecule, and have no fixed axis of rotation, or else the molecule, with its currents and polarities, would rotate, and thus be acting in accordance with the theory of De la Rive. 3. This theory does not explain why (as in the case of soft iron) polarity should disappear whenever the exciting cause is removed, as in the case of transient magnetization. It would thus require a coercive force in iron to cause exactly one-half of the molecules to instantly reverse their direction, in order to pass from apparent external polarity to that of neutrality. The influence of mechanical vibrations and stress upon iron in facilitating or discharging its magnetism, as proved by Matteucci, 1847, in addition to the discovery by Page, 1837, of a molecular movement taking place in iron during its magnetization, producing audible sounds, and the discovery by Dr. Joule, 1842, of the elongation of iron when magnetized, led De la Rive, in his remarkable "Treatise on Electricity," 1853, to give his theoretical views upon magnetism in the following remarkable words: "The whole of the magnetic molecular phenomena that we have been studying lead us to believe that the magnetization of a body is due to a particular arrangement of its molecules, originally endowed with magnetic virtue, but which in the natural state are so arranged that the magnetism of the body that they constitute is not apparent. Magnetism would, therefore, consist in disturbing this state of equilibrium, or in giving to the particles an arrangement that makes manifest the property with which they are endowed, and not in developing it in them. The coercitive force should be the resistance of the molecules to change their relative positions."

Wiedermann, in 1861, gives a theory in which he admits the fluids of Poisson or the elementary currents of Ampère as the cause of polarity of the molecule, but believes that the molecules are turned in a general direction in the case of polarity, and that in neutrality, like Ampère's, the magnetic axes of the molecules are turned in all directions. Maxwell, in his remarkable treatise on "Electricity and Magnetism," 1881, page 75, gives the following *resumé* of Weber's theory: "Weber's theory differs from Poisson's in assuming that the molecules of the iron are always magnets, even before the application of the magnetizing force, but that in ordinary iron the magnetic axes of the molecules are turned indifferently in every direction, so that the iron, as a whole, exhibits no magnetic properties." And, again, page 429, Maxwell says he agrees with Weber's views, and that neutrality, or unmagnetized iron, has the axes of its molecules placed indifferently in all directions, and that the act of magnetization consists in turning all the molecules, so that their axes are either rendered all parallel to one direction, or at least deflected in that direction. I have quoted these several theories which admit of the inherent polarity of the molecule, and in that respect they entirely agree with my own; but the induction balance at once shows that they are erroneous in the most important part, for my researches have proved that neutrality is perfectly symmetrical, that there is no case of neutrality where the axes of the molecules are turned indifferently in all directions, and that we cannot obtain perfect neutrality except when the molecules form a complete closed circuit of attraction. I believe that a true theory of magnetism should admit of complete demonstration, that it should present no anomalies, and that all the known effects should at once be explained by it. From numerous researches, I have gradually formed a theory of magnetism entirely based upon experimental results, and these have led me to the following conclusions:

1. That each molecule of a piece of iron, steel or other magnetic metal is a separate and independent magnet, having its two poles and distribution of magnetic polarity exactly the same as its total evident magnetism when noticed upon a steel bar-magnet.

2. That each molecule, or its polarity, can be rotated in either direction upon its axis by torsion, stress or by physical forces such as magnetism and electricity.

3. That the inherent polarity or magnetism of each molecule is a constant quantity, like gravity; that it can neither be augmented nor destroyed.

4. That when we have external neutrality, or no apparent magnetism, the molecules, or their polarities, arrange themselves so as to satisfy their mutual attraction by the shortest path, and thus form a complete closed circuit of attraction.

5. That when magnetism becomes evident, the molecules or their polarities have all rotated symmetrically in a given direction, producing a north pole if rotated in that direction as regards the piece of steel, or a south pole if rotated in the opposite direction. Also, that in evident magnetism we have still a symmetrical arrangement, but one whose circles of attraction are not completed except through an external armature joining both poles.

6 That we have permanent magnetism when the molecular rigidity, as in tempered steel, retains them in a given direction, and transient magnetism whenever the molecules rotate in comparative freedom, as in soft iron.

EXPERIMENTAL EVIDENCES.

In the above theory the coercive force of Poisson is replaced by molecular rigidity and freedom, and as the effects of mechanical vibrations, torsion and stress upon the apparent destruction and facilitation of magnetism is well known, I will, before demonstrating the more serious parts of the theory, cite a few experiments to prove that molecular rigidity fulfills all the requirements of an assumed coercive force. The influence of vibrations, torsion, or stress of any kind upon a magnetized steel or iron rod may be seen by striking with a wooden mallet rods of hard and soft steel, also hard and soft iron previously magnetized to a known degree. The tempered steel, owing to its molecular rigidity, will lose but 5 per cent.; the soft steel, 60; hard iron, 50, and soft Swedish iron, 99 per cent. of its magnetism, the amount of loss depending not so much upon whether the metal be steel or iron as upon its degree of hardness and softness; and as hard steel requires far more power to magnetize it to the same force than iron, it is possible to imagine a steel so hard that its molecules could not rotate, and that, consequently, no magnetism could be manifested from a given inducing cause, while a perfectly soft iron would give the maximum effect, and instantly return to its previous state. From this we might in error suppose that soft Swedish iron could not retain its magnetism, and that its natural state would be zero, or neutrality. The apparent disappearance of magnetism, however, is here due to the extreme freedom of motion of its molecules, allowing them at once to follow the comparatively feeble directing force of the earth's magnetism. We can demonstrate this by feebly magnetizing a rod of soft iron held vertically, so that its north pole is at the lower portion. Upon removing the inducing magnet, or electro-magnetic coil, we find that the rod retains a powerful north polarity, but if magnetized in a contrary sense, then we have only traces of magnetism left upon the withdrawal of the inducing cause. To succeed in this experiment, as in all others where soft iron is mentioned, we should use the best Swedish charcoal iron, thoroughly annealed at high temperature. We find, again, that rods of steel or iron will lose far less magnetism when vibrated in the magnetic dip, or vertically, when their north poles are at the lowest extremity, than when horizontal, or still less than when their poles are contrary to those of the earth's field, and also that they will acquire their maximum magnetism from a given exciting cause when held vertically as described, and the molecules allowed greater freedom of motion to obey the directing influence by vibrations, torsion, stress or blows upon the iron. Any influence that would tend to give greater freedom of motion, such as heat or mechanical trepidations, gives a far higher magnetic force to the iron than could be obtained without these aids.

In order to render visible the effects of motion upon magnetism, we may take two glass tubes or ordinary vials of any length or diameter, say, 10 centimeters in length by two centimeters in diameter. If we now put iron filings in these tubes, leaving about one-third vacant, so as to allow complete freedom in the filings when shaken, we find that each tube, when magnetized, retains an equal amount of residual magnetism, and that this all disappears upon slightly shaking the tube. We are thus imitating the effects of vibration. But if in one of these tubes we pour melted rosin (in fact, any slightly viscous liquid, such as petroleum, suffices), we then render these filings more rigid, and then we can no longer produce by shaking the disappearance of its residual magnetism. In pouring in petroleum we have apparently been introducing a strong coercitive force, but we know that it can only have the mechanical effect of rendering the iron filings less free to turn, and so comparatively rigid. If we desire to see the effect of torsion, we have only to shake the filings so that when the tube is held horizontally the vacant space is above, and rotate it slightly (but without shaking) about a horizontal axis. Its remaining magnetism instantly disappears upon rotation, although we evidently have not changed the longitudinal position of its particles. A similar effect takes place upon a soft iron rod; for if we magnetize it, and observe its remaining magnetism, we find that, upon giving a slight torsion to this wire, its remaining magnetism instantly disappears—a similar effect to that in the rotating tube of iron filings. But if the iron is rendered more rigid by hammering, or steel rendered hard and rigid by tempering, torsions or vibrations have but little effect, as in the case of the filings rendered rigid as above mentioned. Thus we have no longer need of an assumed mysterious coercitive force to account for the retention of magnetism; for once knowing the mechanical qualities of iron and steel, and their degree of molecular rigidity or hardness, we can at once predict their retentive magnetic powers.

ROTATION OF INHERENT POLARIZED MOLECULES.

Torsion, as well as mechanical vibrations, has, as we have seen, a powerful influence in aiding the molecules to overcome their inertia, and thus aid them to rotate in the direction of the inducing influence, and we may thus polarize strongly a flat soft-iron rod by simply bending or vibrating it when held vertically, and if we measure the magnetic force obtained, we shall notice that the force is strictly relative to the degree of softness of the iron. Thus, with hard steel we should obtain only traces of polarization, while with extremely pure soft Swedish iron we obtain the maximum of force. The bar of iron or steel, being held in the earth's magnetic field, of infinite size compared with the bar, and infinitely homogeneous, cannot deflect or weaken its surrounding field. Its lower portion being north, apparently strengthens it by its reaction, while its upper, south, apparently weakens the field; but, as Maxwell has shown, "the two poles of each molecule are equal and opposite; consequently, the sum of each molecule and the whole mass must be zero." We have a far greater induced polarity in iron or steel when the iron is in thin bars or small wires, and this we should expect, as the external molecules rotate directly under the influence of the earth's magnetism, while those forming the interior of the bar either rotate feebly, or, as in the case of very thick bars, actually act as an armature, preventing, by their influence, free rotation of the exterior molecules. Thus, as the sum of the two and equal polarities in a bar of iron is zero, it is evident that its polarity must be inherent. I have some remarkably pure soft Swedish iron wire, 1 mm. in diameter, and as its inherent polar force seemed great when held vertically in the earth's magnetic field, I measured in the induction balance this force compared with a similar column of the magnetic atmosphere which it displaced. The inherent polarity of this wire, simply rendered evident by the earth's magnetism, was 15,600 greater than the column it displaced. We cannot, either by induction, conduction or concentration, produce a greater force in another body of similar displacement or size, otherwise we could easily create power from a feeble source. Thus the enormously greater magnetic power observed in iron than the same column of air which it displaces must be due to the inherent polarity of its molecules.

Among numerous bars of iron upon which I have experimented, one of ordinary hoop iron, 2 cm. wide, 40 cm. long and 1½ mm. thick, not softened, possesses sufficient molecular rigidity to be apparently uninfluenced by earth's magnetism. When this rod is rendered neutral, we have but feeble polarity—mere traces when it is held vertically under the earth's magnetic influence; but if we apply a few successive torsions or vibrations to it when thus held, we have at once several thousand times greater polarity than before. Now, if iron had the power of deflecting or concentrating the earth's magnetism upon itself, it should not require the mechanical aid to molecular rotation given to it by these torsions or vibrations. Thus we are forced to conclude at least the existence of the inherent polarity of the molecules; and, if we admit this, we must also, as a necessary consequence, admit the rotation of these molecules, else we cannot explain why mechanical vibrations allowing freedom of motion should always produce the polarity in accordance with the directing cause. I have already shown that torsion and vibrations *per se* are apparently destructive of magnetism; consequently, in this case Poisson's two fluids and Ampère's parallel currents should, according to their theory, be mixed or heterogeneous, while according to the views I am sustaining the polarized molecules should obey, as compass needles, any magnetic directing cause whenever sufficient molecular freedom of motion allows free rotation. The inherent polarity of iron may again be observed by drawing a flat rod of soft iron over one or both poles of a permanent magnet. This rod will then be powerfully magnetized, its remaining magnetism, when separated from the magnet, being sufficiently powerful to strongly deflect a suspended direction needle. A few slight torsions or vibrations will then completely discharge it. Now, suppose this operation repeated successively many thousand times: if there were no inherent polarity we should have gradually drawn all the polarity out of the magnet and discharged it into the atmosphere. Nothing of the kind takes place. The molecules of the iron are simply rotated each time, and the only energy in work expended or lost comes from the arm of the experimenter, and the energy required would be strictly in accordance with the molecular freedom, or softness and hardness of the iron and steel: thus, while soft iron could be easily polarized and discharged by mechanical torsions, hard-

*Read before the Society of Telegraph Engineers and of Electricians, May 24, 1883.

†"On an Induction Current Balance and Experimental Researches made therewith."—"Proceedings Royal Society," March 29, p. 56, 1879.

‡"Proceedings Royal Society," May 10, 1884.

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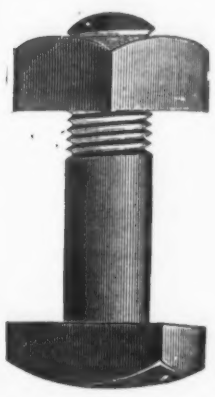

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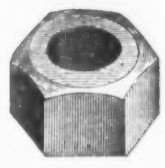

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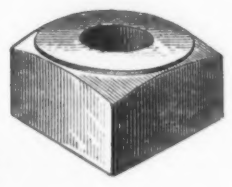

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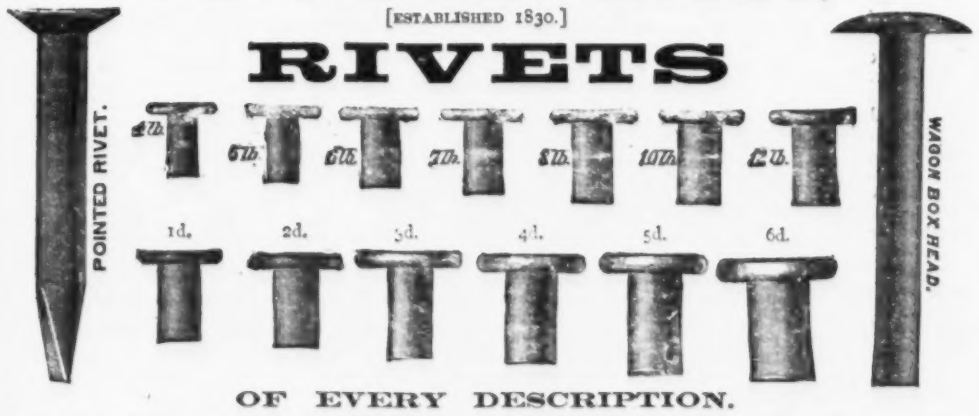

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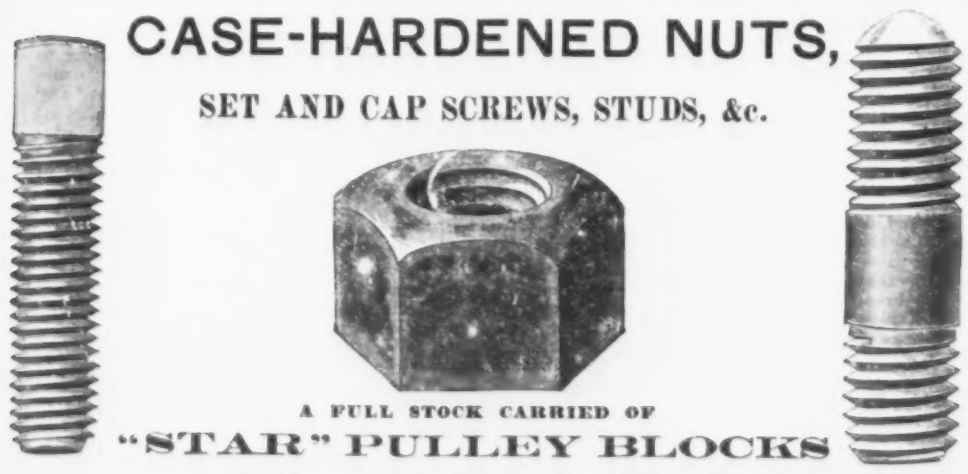

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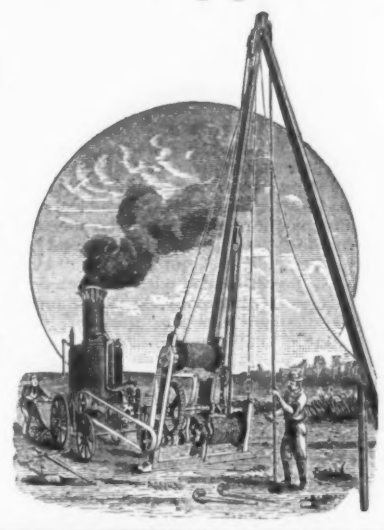

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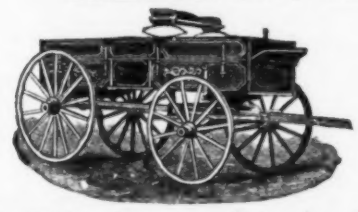

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tempered steel would require a far greater amount. Dr. Warren De la Rue, F.R.S., kindly aided me in this part of the research by passing a current from his well-known chloride-of-silver battery through iron and steel wires. A condenser of 42.8 microfarad capacity, charged by 3360 cells, was used. We passed this enormous electric charge longitudinally through the wires, and observations were made as to whether any change whatever was produced in their quality or inherent polarity, the result being that these wires gave exactly the same magnetic polarity from a given direction or inducing cause as before, being similar in nature and degree; consequently, this enormous electric force had not changed or destroyed the original inherent polarity. If the molecules possess inherent polarity and rotate upon their axes, similar to a series of compass needles having a slight degree of frictional rigidity, then, upon passing one pole of a magnet above them, they would turn symmetrically in one direction, and drawing the same pole of the magnet in the contrary direction would rotate them, and they would then remain symmetrically in the opposite direction.

A precisely similar effect takes place in a soft-iron rod placed east and west a few inches above a direction needle. Upon drawing the south pole of a powerful natural magnet at a few centimeters distance above the wire from east to west, the north polarities of the molecules successively turn in the direction of west, following the attraction of the south pole, as previously seen on the small compass needles. The rod is now magnetized with its north pole west, as indicated by the direction needle below any portion of this rod. Upon passing the same south pole of the natural magnet in a contrary direction, the molecules all rotate, their north poles still turning successively to the south pole of the permanent magnet until its arrival at the end from which the first magnetization commenced. The rod has now entirely changed its polarity, and its north pole is east. This phenomenon is well known in the ordinary magnetization of rods, where care is taken to draw the magnet always in a similar direction, or the poles would be reversed at each to-and-fro drawing. To account for this on Coulomb-Poisson's theory, it would be requisite that, first, all the fluids be separated with their north fluids symmetrically in one direction, but on drawing back the magnet these fluids would have to mix together, the north fluid passing through its south fluid to be finally opposite to its previous position, its coercive force doing the double work of allowing both fluids to mix and pass through each other, and finally keeping them entirely apart. Ampère's theory would require that from a haphazard arrangement the molecules should become symmetrically arranged upon the first passage of the magnet, then upon its reversed direction one-half of the electric elementary currents should successively revolve in a contrary direction to arrive at neutrality before, finally, the other half followed the direction of the first half, and now all these currents would be revolving in the opposite direction to that upon the first magnetization. We thus see that both these theories, while resting altogether upon assumption, are extremely complicated and improbable. We might suppose, from the theory which I am advocating, that upon the rotation of the molecules there would be some disturbance or mechanical trepidation; and such is found to be the case, as first observed by Page, and afterward verified by Dr. Joule and De la Rive, in the molecular sounds produced in iron upon its magnetization. Reis's first telephone was founded upon these sounds, and Du Moncel has made numerous researches upon this subject. In the last of my experiments cited, the sounds are too feeble to be heard, but by the application of the microphone these trepidations at once become audible.

That molecules of iron and other metale rotate with time, whose period becomes shortened by mechanical vibrations, is well known in metallurgy, the ultimate result being generally the passage from a fibrous condition, as in iron wires, to a high degree of crystallization. For many years I employed a circular vibrating spring as the regulator of speed of my printing telegraph instrument, and although this spring was so regulated by means of a frictional break, or "Frein," as not to surpass its limits of elasticity, these springs were constantly breaking after a few days' use, and, as a matter of urgent necessity, I made special researches into the cause of this breaking after a few days' constant vibratory action. I found at the point of rupture a high state of crystallization. Fibrous iron would thus become thoroughly crystallized and break in one day, the number of vibrations for an instrument in constant use during 24 hours being 1,209,600. Thus we could roughly estimate the life of iron in the form of one of these springs at 1,000,000 vibrations. Copper crystallized in one hour, and all metals and alloys were inferior to steel except aluminum bronze. The latter springs would stand six weeks' constant use, or some 50,000,000 of vibrations. I finally resolved this problem by spreading the amount of vibrating work over a spiral spring containing 3 m. of steel rod wound into the same space as previously held by the straight rod of 30 cm. By this means the average life of these springs has become five years. Evidently the molecules of these fibrous springs must have rotated under the vibrations in order to produce crystals. The same phenomenon is observed in axles of carriages receiving constant trepidations, large crystals being always found at the point of fracture. Again, if we rapidly magnetize and demagnetize an iron rod, we have the production of evident heat, due to the constant motion of its molecules. Maxwell describes an experiment of Beetz, in which an exceedingly small filament of iron was deposited by electrotype, under the influence of a strong magnetic field, in order to arrive at the inherent polarity of comparatively few molecules, and, as its magnetic force was very great, he regards the experiment as conclusive. My own experiments show that we have far less external magnetic force from a solid bar than from a thin tube or flat bar of the same surface exposed to a limited exciting cause. We know that magnetism does not penetrate to a very great depth, and we also know that, if to a thin steel permanent magnet we place another piece unmagnetized, or, better still, a rod of soft iron, its external polarity is greatly reduced; consequently, the external evidence of polarity is not a direct measure of the degree of rotation, nor of the total inherent polarity of its mass. We may have a great superficial external rotation superposed upon rotations of an opposite nature, as will be seen later, and thus the internal molecules of a magnet often act more or less as an external armature in closing its circle of attractions.

I have stated my belief that the molecule itself possesses its inherent polarity, which, like gravity, is an endowed quality for which we have no more reason to suspect the cause to be elementary electric currents than that elementary currents should be the cause of gravity, chemical affinity, or cohesion, and its polar power of crystallization, most of which are effected by an electric current. We have a certain analogy between electric currents and magnetism, but not so great as the analogy between the magnetic polarity of a molecule and its other endowed qualities. Magnetism, like chemical affinity, cohesion and crystallization, has its critical points. Faraday discovered that at red-yellow heat iron instantly lost its apparent polar magnetic power, to be as instantly restored at red heat, the critical point varying in iron, steel, &c., and being the lowest in nickel. This would be difficult to explain upon Ampère's theory, as we should have to admit the instant destruction or cessation of the elemeutary currents, to be again restored at a few degrees less temperature. It would be equally difficult to explain under my view, if it did not belong to a whole class of phenomena due to the possession by the molecules of various endowed qualities, of which chemistry and all our means of research can only teach us their critical points, without attempting to explain why, for instance, iron has a greater affinity for oxygen than gold. We know that is so; we know that the molecules of all matter are endowed with certain qualities having certain critical points, and I can see no reason for separating their magnetic inherent polarity from their numerous other qualities.

NEUTRALITY.

The apparatus needed for researches upon evident external polarity requires no very great skill or thought, but simply an apparatus to measure correctly the force of the evident repulsion or attraction. In the case of neutrality, however, the external polarity disappears, and we consequently require special apparatus, together with the utmost care and reflection in its use. From numerous researches previously made by means of the induction balance, the results of which I have already published, I felt convinced that in investigating the cause of magnetism and neutrality I should have in it the aid of the most powerful instrument of research ever brought to bear upon the molecular construction of iron, as, indeed, of all metals. It neglects all forces which do not produce a change in the molecular structure, and enables us to penetrate at once to the interior of a magnet or piece of iron, observing only its peculiar structure and the change which takes place during magnetization or apparent neutrality. The induction balance is effected by three distinct arrangements of molecular structure in iron and steel, by means of which we have apparent external neutrality.

If we take a flat bar of soft iron, of 30 or more cm. in length, and hold it vertically (giving, while thus held, a few torsions, vibrations—or, better still, a few slight blows with a wooden mallet—in order to allow its molecules to rotate with perfect freedom), we find its lower end to be of strong north polarity and its upper end south. On reversing the rod and repeating the vibrations, we find that its lower end has precisely a similar north polarity. Thus the iron is homogenous, and its polarity symmetrical. If we now magnetize this rod to produce a strong south pole at its lower portion, we can gradually reverse this polarity by the influence of earth's magnetism, by slightly tapping the upper extremity with a small wooden mallet. If we observe this rod by means of a direction needle at all parts, and successively during its gradual passage from one polarity to the other, there will be no sudden break into a haphazard arrangement, but a gradual and perfectly symmetrical rotation from one direction to that of the opposite polarity. If this rod is placed east and west, having, first, say, a north polarity to the right, we can gradually discharge or rotate the molecules to zero, and as gradually reverse the polarity by simply inclining the rod so as to be slightly influenced by earth's magnetism, and at no portion of this passage from one polarity to neutrality, and to that of the opposite name, will there be found a break of continuity of rotation or haphazard arrangement. If we rotate this rod slowly, horizontally or vertically, taking observations at each few degrees of rotation of an entire revolution, we find still the same gradual symmetrical change of polarity, and that its symmetry is as complete at neutrality as in evident polarity.

In all these cases there is no complete neutrality, the longitudinal polarity simply becoming transversal when the rod is east and west. If, in place of the rod, we take a small square soft-iron plate and allow its molecules freedom under the sole influence of the earth's magnetism, then we invariably find the polarity in the direction of the magnetic dip, no matter in what position it be held, and a sphere of soft iron could only be polarized in a similar direction. Thus we can never obtain complete external neutrality while the molecules have freedom and do not form an internal closed circle of mutual attractions, and, whatever theory we may adopt as to the cause of polarity in the molecule, such as Coulomb's, Poisson's, Ampère's, there can exist no haphazard arrangement in perfectly soft iron as long as it is free from all external causes except the influence of the earth; consequently, these theories are wrong in one of their most essential parts. We can, however, produce a closed circle of mutual attractions in iron and steel, producing complete neutrality as long as the structure is not destroyed by some stronger external directing influence. Oersted discovered that an external magnetic needle places itself perpendicular to an electric current; and we should expect that, if the molecules of an iron wire possessed inherent polarity and could rotate, a similar effect would take place in the interior of the wire to that observed by Oersted. Wiedermann first remarked this effect, and it has been known as circular magnetism. This circle, however, consists really in each molecule having placed itself perpendicular to the current, simply obeying Oersted's law, and thus forming a complete circle in which the mutual attractions of the molecules forming that circle are satisfied. This wire becomes completely neutral, any previous symmetrical arrangement of polarity rotating to form its complete circle of attractions; and we can thus form in hard iron and steel a neutrality extremely difficult to break up or destroy. We have evident proof that this neutrality consists of a closed chain or circle, as by torsion we can partially deflect them on either side; thus from a perfect externally neutral wire, producing either polarity, by simple mechanical angular displacement of the molecules as by right or left handed torsion. If we magnatize a wire placed east and west, it will retain this polarity until freed by vibrations, as already remarked. If we pass an electric current through this magnetized wire, we can notice the gradual rotation of the molecules, and the formation of the circular neutrality. If we commence with a weak current, gradually increasing its strength, we can rotate them as slowly as may be desired. There is no sudden break or haphazard moment of neutrality; the movements to perfect zero are accomplished with perfect symmetry throughout.

We can produce a more perfect and shorter circle of attractions by the superposition of magnetism. If we magnetize a piece of steel or iron in a given direction with a strong magnetic directing power, the magnetism penetrates to a certain depth. If we slightly diminish the magnetizing power, and magnetize the rod in a contrary direction, we may reduce it to zero, by the superposition of an exterior magnetism upon one of a contrary name existing at a greater depth, and if we continue this operation, gradually diminishing the force at each reversal, we can easily superpose 10 or more distinct symmetrical arrangements, and, as their mutual attractions are satisfied in a shorter circle than in that produced by electricity, it is extremely difficult to destroy this formation when once produced. The induction balance affords also some reasons for believing that the molecules not only form a closed circle of attractions, but that they can mutually react upon each other, so as to close a circle of attractions as a double molecule. The experimental evidence, however, is not sufficient to dwell on this point, as the neutrality obtained by superposition is somewhat similar in its external effects. We can produce a perfectly symmetrical closed circle of attractions, by forming a steel wire into a closed circle 10 cm. in diameter, if this wire is well joined at its extremities by twisting and soldering. We can then magnetize this ring by slowly revolving it at the extremity of one pole of a strong permanent magnet, and, to avoid consequent poles at the part last touching the magnet, we should have a graduating wedge of wood, so that while revolving it may be gradually removed to greater distance. This wire will then contain no consequent points of external magnetism; it will be found perfectly neutral in all parts of its closed circle.

I have already shown that soft iron, when its molecules are allowed perfect freedom by vibration, invariably takes the polarity of the external directing influence, such as that of the earth, and it does so even with greater freedom under the influence of heat. Manufacturers of electro-magnets for telegraphic instruments are very careful to choose the softest iron and thoroughly anneal it, but very few recognize the importance as regards the position of the iron while annealing it under the earth's directing influence. The fact, however, has long since been observed. Doctor Hooker, 1684, remarked that steel or iron was magnetized when heated to redness and placed in the magnetic meridian. I have slightly varied this experiment by heating to redness three similar steel bars, two of which had been previously magnetized to saturation, and placed separately with contrary polarity as regards each other, the third being neutral. Upon cooling, these three bars were found to have identical and similar polarity. Thus the molecules of this most rigid material, cast steel, had become free at red heat, and rotated under the earth's magnetic influence, giving exactly the same force on each; consequently, the previous magnetization of two of these bars had neither augmented nor weakened the inherent polarity of their molecules. Soft iron gave under these conditions by far the greatest force, its inherent polarity being greater than that of steel. I have made numerous other experiments bearing upon the question of neutrality, but they all confirm those I have cited, which I consider afford ample evidence of the symmetrical arrangement of neutrality.

SUPERPOSED MAGNETISM.

Knowing that by torsion we can rotate or diminish magnetism, I was anxious to obtain by its means a complete rotation from north polarity to neutrality, and from neutrality to south polarity, or to completely reverse magnetic polarity by a slight right or left torsion. I have succeeded in doing this, and in obtaining strong reversal of polarities, by superposing one polarity given while the rod is under a right elastic torsion with another of the opposite polarity given under a left elastic torsion, the neutral point then being reached when the rod is free from torsion. The rod should be very strongly magnetized under its first or right-hand torsion, so that its interior molecules are rotated, or, in other words, magnetized to saturation; the second magnetization in the contrary sense and torsion should be feebler, so as only to magnetize the surface, or not more than one-half its depth; these can be easily adjusted to each other so as to form a complete polar balance of force. The apparatus needed is simply a good compound horse-shoe permanent magnet, 15 cm. long, having six or more plates, giving it a total thickness of at least 3 cm. We need a sufficiently powerful magnet, as I find that I obtain a more equal distribution of magnetism upon a rod or strip of iron by drawing it lengthwise over a single pole in a direction from that pole; we can then obtain saturation by repeated drawings, keeping the same molecular symmetry in each experiment. In order to supply a slight elastic torsion when magnetizing rods or wires, I have found it convenient to attach two brass clamp keys to the extremities of the rods, or simply turn the ends at right angles, as shown in the following diagram, by which means we can apply an elastic twist or torsion while drawing the rod over the pole of the permanent magnet. We can thus superpose several and opposite symmetrical structures, producing a polar north and south as desired, greatly in excess of that possible under a single or even double magnetization, and by carefully adjusting the proportion of opposing magnetisms, so that both polarities have the same external force, the rod will be at perfect external neutrality when free from torsion.

If we now hold one end of this rod at a few centimeters distance from a magnetic directive needle, we find it perfectly neutral when free of torsion, but the slightest torsion right or left at once produces violent repulsion or attraction, according to the direction of the torsion given to the rod, the iron rod or strips of hoop iron which I use for this experiment being able, when at the distance of 5 cm. from the needle, to turn it instantly 90° on either side of its zero. The external neutrality that we can now produce at will is absolute, as it crosses the line of two contrary polarities, being similar to the zero of my electric sonometer, whose zero is obtained by the crossing of two opposing electric forces. This rod of iron retains its peculiar powers of reversal in a remarkable degree, a condition quite different to that of ordinary magnetization, for the same rod, when magnetized to saturation under a single ordinary magnetism, loses its evident magnetism by a few elastic torsions, as I have already shown; but when it is magnetized under the double torsion with its superposed magnetism, it is but slightly reduced by variations or numerous torsions, and I have found it impossible to render this rod again free from its double polar effects, except by strongly remagnetizing it to saturation with a single polarity. The superposed magnetism then becomes a single directive force, and we can then, by a few vibrations or torsions, reduce the rod to its ordinary condition. The effects of superposed magnetism and its double polarity I have produced in a variety of ways, such as by the electro magnetic influence of coils, or in very soft iron simply by the directive influence of the earth's magnetism, reversing the rod and torsions when held in the magnetic meridian, these rods, when placed magnetic west, showing distinctly the double polar effects. It is remarkable, also, that we are enabled to superpose and obtain the maximum effects on thin strips of iron from ¼ to ½ mm. in thickness, while in thicker rods we have far less effect, being masked by the comparatively neutral state of the interior, the exterior molecules then reacting upon those of the interior, allowing them to complete in the interior their circle of attractions.

I was anxious to obtain wires which would preserve this structure against the destructive influence of torsion and vibrations, so that I could constantly employ the same wires without the comparatively long and tedious process of preparation. Soft iron soon loses the structure, or becomes enfeebled, under the constant to and-fro torsions requisite where we desire a constant change of polarity, as described later in the magnetic bells. Hard steel preserves its structure, but its molecular rigidity is so great that we obtain but mere traces of any change of polarity by torsion. I have found, however, that fine cast steel, untempered, of the kind employed by watch makers, is most suitable; these are generally sold in straight lengths of 30 cm. Wires 1 mm. in diameter should be used, and when it is desired to increase the force, several of these wires—say, nine or ten—should be formed into a single rod or bunch. The wire as sold is too rigid to give its maximum of molecular rotation effect. We must, therefore, give it two entire turns or twists to the right, and strongly magnetize it on the north pole of the magnet while under torsion. We must again repeat this operation in the contrary direction, after restoring the wire to its previous position, giving now two entire turns to the left, and magnetising it on the south pole. On restoring the wire to its original place, it will be extremely flexible, and we may now suppose several polarities under contrary tortions, as already described. The power of these wires, if properly prepared, is most remarkable, being able to reverse their polarity under torsion, as if they were completely saturated, and they preserve this power indefinitely if not touched by a magnet.

It would be extremely difficult to explain the action of the rotative effects obtained in these wires under any other theory than that which I have advanced, and the absolute external neutrality that we obtain in them when the polarities are changing we know, from their structure, to be perfectly symmetrical. I was anxious to show, upon the reading of this paper, some mechanical movement produced by molecular rotation; consequently, I have arranged two bells that are struck alternately by a polarized armature put in motion by the double polarized rod I have already described, but whose position at 3 cm. distant from the axes of the armature remains invariably the same. The magnetic armature consists of a horizontal light steel bar suspended by its central axle; the bells are thin wine glasses, giving a clear musical tone, loud enough, by the force with which they are struck, to be clearly heard at some distance. The armature does not strike these alternately by a pendulous movement, as we may easily strike only one continuously, the friction and inertia of the armature causing its movements to be perfectly dead-beat when not driven by some external force, and it is kept in its zero position by a strong directive magnet placed beneath its axis. The mechanical power obtained is extremely evident, and is sufficient to put the sluggish armature in rapid motion, striking the bells six times per second, and with a power sufficient to produce tones loud enough to be clearly heard in all parts of the hall of the society. As this is the first direct transformation of molecular motion into mechanical movement, I am happy to show it on this occasion. There is nothing remarkable in the bells themselves, as they evidently could be rung if the armature was surrounded by a coil and worked by an electric current from a few cells. The marvel, however, is in the small steel superposed magnetic wire producing by slight elastic torsions from a single wire, 1 mm. in diameter, sufficient force from mere molecular rotation to entirely replace the coil and electric current.

ELASTIC NATURE OF THE ETHER SURROUNDING THE MAGNETIC MOLECULES.

During these researches I have remarked a peculiar property of magnetism, viz., that not only can the molecules be rotated through any degree of arc to its maximum or saturation, but that, while it requires a comparatively strong force to overcome its rigidity or resistance to rotation, it has a small field of its own through which it can move with excessive freedom, trembling, vibrating or rotating through a small degree with infinitely less force than would be required to rotate it permanently on either side. This property is so marked and general that we can observe it without any special iron or apparatus. Let us take a flat rod of ordinary hoop iron, 30 or more centimetres in length. If, while holding this vertically, we give freedom to its molecules by torsions, vibrations—or, better still, by a few blows with a wooden mallet upon its upper extremity—we find, as is well known, that its lower portion is strongly north and its upper south. If we reverse the rod, we now find it neutral at both extremeties. We might here suppose that the earth's directing force had rotated the molecules to zero or transversely, which in reality it has done, but only to the limit of their comparatively free motion; for if we reverse the rod to its orignal position, its previous strong polarity reappears at both extremities; thus the central point of its free motion is inclined to the rod, giving by its free motion great symmetrical inclination and polarity in one direction, but when reversed the inclination is reduced to zero.

This property of comparative freedom, and the rotation of its center of action, can be demonstrated in a variety of ways. One remarkable example of it consists in the telephone. All those who are thoroughly acquainted with electro-magnetism, and know that it requires measurable time to charge an electro-magnet to saturation (about $\frac{1}{15}$ of a second for those employed in telegraphy), were surprised that the telephone could follow the slightest change of timbre, requiring almost innumerable changes of force per second. I believe the free rotation I have spoken of through a limited range explains its remarkable sensitiveness and rapidity of action, and, according to this view, it would also explain why loud-sounding telephones can never repeat all delicacy of timbre that is easily done with those only requiring a force comprised in the critical limits of its free rotation. This property, I have found, has a distinct critical value for each class of iron, and I propose soon to publish researches upon the molecular construction of steel and iron, in which I have made use of this very property as a guide to the quality of the iron itself. The elastic rotation (in a limited space) of a molecule differs entirely from that known as mechanical elasticity. In perfectly soft iron we have feeble mechanical elasticity, while in tempered steel we have that elasticity at its maximum. The contrary takes place as regards molecular elasticity. In tempered steel the molecules are extremely rigid, and in soft iron its molecular elasticity is at its maximum. Its free motion differs entirely from that given it by torsion or stress. We may assume that a molecule is surrounded by continuous ether, more of the nature of a jelly than of that of a gas; in such a medium a molecule might freely vibrate through small arcs, but a rotation extending beyond its critical limit would involve a much greater expenditure of force.

The discovery of this comparatively free rotation of molecules, by means of which, as I have shown, we can (without in any degree disturbing the external mechanical elasticity of the mass) change the axes of their free motion in any direction desired, has led me into a series of researches which have only indirectly any relation with the theory of magnetism. I was extremely desirous, however, of finding an experimental evidence which in itself should demonstrate all portions of the theory, and the following experiment, I believe, answers this purpose: Let us take a square soft-iron rod, 5 mm. in diameter by 30 or more centimeters in length, and force the molecules, by aid of blows from a wooden mallet, as previously described, to have their centers of free motion in one direction; the rod will (as already shown) have polarity at both ends when held vertically, but if reversed both ends become completely neutral. If now we turn the rod to its first position, in which it shows strong polarity, and magnetize it while held vertically, by drawing the north pole of a sufficiently powerful permanent magnet from its upper to its lower extremity, we find that this rod, instead of having south polarity at its lower portion, as we should expect from the direction of the magnetization, is completely neutral at both extremities; but if we reverse the rod, its fullest free powers of magnetization now appear in the position where it was previously neutral. Thus, by magnetization, we have completely rotated its free path of action, and find that we can rotate this path as desired in any direction by the application of a sufficient directing power. If we take a rod as described, with its polarities evident when held vertically, and its neutrality also evident when its ends are reversed in the same magnetic field, we find that its polarity is equal at both ends, and that it is every way symmetrical with a perfect magnet. If we gradually reverse the ends and take observations of its condition through each degree of arc passed over, we find an equal symmetrical diminution of evident external polarity until we arrive at neutralty, when it has no external trace of inherent polarity, but its inherent polarity at once becomes evident by a simple return to its former position. Thus the rod has passed through all the changes from polarity to neutrality, and from neutrality to polarity, and these changes have taken place with complete symmetry.

The limits of this paper do not allow me to speak of the numerous theoretical evi-

dences as shown by the use of my induction balance. I believe, however, that I have cited already experimental evidences to show that what has been attributed to coercive force is really due to molecular freedom or rigidity; that in inherent molecular polarity we have a fact admitted by Coulomb, Poisson, Ampère, De la Rive, Weber, Du Moncel, Weidermann and Maxwell, and that we have also experimental evidence of molecular rotation and of the symmetrical character of polarity and neutrality. The experiments which I have brought forward in this paper, in addition to those mentioned in my paper read before the Royal Society, will, I hope, justify me in having advanced a theory of magnetism which I believe in every portion allows at least experimental evidences of its probable truth.

The Metal Exchange.

At a meeting of the Exchange, on the 29th ust., the following amendments were made to the by-laws:

Add to Art. IV a new Sec. 7. "No salaries or compensation of any kind shall be paid to any officer, manager, employee or committeeman, except such as are provided in the by-laws or trade rules, or as may be fixed by a vote of the Board of Managers."

Add to Art. V, Sec. 1. "Any vacancy in the Arbitration Committee may be filled by the Board of Managers, voting by ballot, until the next annual election."

Add to Art VI a new Sec. 13. "Should special exigencies require, the president shall have the right to appoint committees and fill vacancies on committees *ad interim*, to act until the regular appointments are made."

Change numbers of Articles VII, VIII and IX to VIII, IX and X, respectively, and insert the following as new Article VII:

Sec. 1. It shall be the duty of any member failing to meet his contracts made under the rules of the Exchange with or to any other member of this Exchange, to immediately notify the president in writing of such failure (unless otherwise agreed upon by the contracting parties), and the president shall thereupon cause the following notice to be posted on the official bulletin:

NOTICE.

Members of this Exchange are hereby notified of the failure of ..... to meet contracts on this Exchange. All contracts with him (or them) must therefore be closed, as provided in Article VII, Section 3, of the by-laws.

Sec. 2. In case any member so failing shall not notify the president, as thus provided, it shall be the duty of the Complaint Committee, upon satisfactory proof to them of such failure being made, to notify the president in writing, and the president shall thereupon immediately call a meeting of the Board of Managers, who shall proceed to investigate the case in the same manner as provided in cases of complaints, in Article VI, Section 8, of these by-laws. In case of satisfactory proof of failure, the president shall be instructed by the Board of Managers to post the same notice as provided in Section 1, and such member may be suspended or expelled at the same or any subsequent meeting of the Board of Managers, by a vote of two-thirds of the members present.

Sec. 3. All outstanding contracts between members so failing and other members of the Exchange, in cases where official notice of failure has been given, must be closed by settlement at the average market price of the day of such official notice of failure. Disputes as to such market price shall be finally determined by the Committee on Trade.

Substitute for Article IX the following:

ARTICLE IX.—AMENDMENT OF BY-LAWS.

These by-laws shall not be altered or amended unless the proposed alteration or amendment has been presented to the Board of Managers at a regular meeting, and approved by a two-thirds vote at a subsequent meeting, and ratified by a majority vote of members voting at a ballot taken for the purpose, of which ten days' notice shall have been given, stating specifically the alteration or amendment proposed.

The secretary has issued the following notice, under date of September 1: "The Metal Exchange will begin to-day to receive from the Maritime Association reports of arrivals of vessels and copies of manifests. Seventeen applications for membership at $500 have been received, leaving 32 vacancies, which must be applied for by 3 o'clock to-day, after which the initiation fee will be $1000."

INDUSTRIAL ITEMS.

MAINE.

The Bath foundry is crowded with work. It has four or five tons of work to do for the Goss Marine Iron Works, including anvil plates weighing 1600 pound each, that are about done, and four large "bearing boxes" for the big engine. They have also 10 large Adir ship's pumps to make immediately.

MASSACHUSETTS.

The new gun factory of the Davenport Arms Company, East Douglas, will, at the outset, be a building 30 x 100 feet, two stories high, and will employ 25 or 30 hands. The gun is the invention of Mr. Wm. H. Davenport, of Providence, a man of 30 years' experience in the business, who has a patent on breech-loading shot guns, acknowledged by competent judges to be a great improvement over any other gun made. The business will include the manufacture of Davenport's gun barrels and his patent breech-loading shot guns, which patent also applies to his two hammerless guns, all of which will be exclusively made at this factory.

The management of the Taunton Iron Works has been given to Mr. W. H. Swanton, who for six years has been the Boston agent of this company, and in his new capacity will give his personal attention to its affairs.

Matters in the Taunton Copper Manufacturing Company are progressing finely under the new dispensation.

The new tack factory of Ripley & Bartlett, Plymouth, is nearly ready for business. The main room for the machines is nearly 85 feet in length on the northerly front, with a varying width of about 35 feet. In the rear of the principal apartment is the engine-room, under the same roof, but guarded from fire by a thickness of five courses of brick from the exterior woodwork. Here is to be an engine of 25 horse-power. The horizontal tubular boiler, 17 feet long, is now being set, and a chimney stack 50 feet high is well under way. Back of the engine-room is the scaling-room, with two ventilators to carry off the carbonic-acid fumes. Near this there are rooms for storage and general purposes. The front face of the building is of two stories, the second being in one hall about 30 x 32 feet for a packing-room.

Webster & Crosby, of Worcester, dealers in scrap iron and old metal, also manufacturers of Babbitt metal, are steadily increasing their trade. A specialty with them is the manufacture of soft-metal hammers for machinists' use, in six sizes, with iron handles and molds.

The Morgan Car Spring Company, Worcester, have ordered a 50-horse-power Armington & Sims Co. engine.

CONNECTICUT.

The rapid increase in the business of the Charles Parker Company, of Meriden, has necessitated the erection of several additions to their factories. Permits have been granted for a brick addition, three stories high, 58 x 83 feet, to the main building. To the plating and buffing department a wooden addition, 60 x 21 feet, will be made, and to the coffee-mill department an addition of 57 x 30 feet will be built. Brick additions will also be made to the boiler-room, and several other improvements are contemplated.

At New Haven, on the 2d inst., a disastrous fire occurred in a large brick building running from No. 22 to No. 30 Artisan street. The fire, which commenced in a lumber yard in the rear of the building, was caused, it is believed, by a spark from a passing locomotive. The building was of brick, four stories high, and was occupied by the New Haven Staple Mfg. Company, the New Haven Mfg. Company, the Strong Cartridge Company, John Adt, machinists' tools and manufacturers' supplies, and Charles Brown, scroll sawing, wood turning, &c. The loss is estimated at $100,000; insurance about $65,000.

NEW YORK.

The New York, West Shore and Buffalo Railroad are driving the machinery in their new shops in a novel and effective manner. Instead of belting from the engine to the line shaft in the usual manner, each shaft is driven by an independent engine coupled directly to it. To effect this the arched doorway in the central brick partition is strengthened by piers, and a second arched opening left over it similar to a transom. The floor of this opening forms the foundation for a Westinghouse engine, which is set with its centers exactly in line with the shafting, to which it is coupled on each side. No regular engineer is employed, but the engine is considered a part of the shafting and is in charge of the wiper. The Westinghouse Machine Company have so far fitted up their shops at New Durham, N. J., with a 12 x 12; at Kingston and Syracuse, N. Y., each with a 9 x 9, and at Schenectady with a 7 x 7.

PENNSYLVANIA.

The past month workmen have been engaged in removing the old boilers of No. 4 Furnace of the Crane Iron Works, Catasauqua, which have been superseded by the new boilers located on the ground near the engine-house. These elevated boilers have been in use since 1849, and when recently in use were insured by the Boiler Insurance Company for the full pressure required, the inspector of which company pronounced them as being made of most excellent iron and capable of carrying the full requirement of steam.

Fifteen additional benches will be erected in the foundry of the Penn Hardware Works, Reading, for the employment of that number of new molders.

It is reported that the Vanderbilt people have purchased the Wister Furnace property at Harrisburg, for the car shops of the new line, for $60,000.

On Friday of last week the Phœnix Iron Company made the first experiment in rolling steel, and it was entirely successful. An angle bar 3 x 4 was turned out. The company intend making a business of this, and will go into it for the purpose of supplying steel for shipbuilding. It is contemplated in the near future to erect steel converting works. This will give work to a large number of men. The change in the business necessitates this move, as steel is fast superseding iron in the manufactures, and it does not pay to buy steel ingots for rolling when it is possible to manufacture them.

Repairs have been commenced at the Port Clinton Rolling Mill, which has been idle over a year.

At the State Department last week a charter was issued to the Clymer Iron Company, of Reading, with a capital of $150,000. This company was incorporated in May, 1873, but at a recent meeting of the stockholders it was decided to apply for a new charter under the provisions of the new constitution.

No. 3 blast furnace of the Phœnix Iron Company, for the week ending August 16 beat all her former good records, by turning out 478.26 gross tons of pig iron. To do this about 906 tons of iron ore, 429 tons of limestone and 1025 tons of coal, a total of 2410 tons of material, were required.

The rolling mill at Gibraltar, Berks County, has stopped for repairs. The work of tearing out the old machinery has begun, preparatory to putting in new machinery. The water-power will be used to run the shears. The mill will be made larger, and it will require several months until the mill is ready to resume.

The Lancaster Watch Company, which suspended operations several weeks ago, owing to financial embarrassment, has resumed, sufficient additional capital having been pledged to insure the successful operation of the works in future.

The additional blocks which the Gautier steel department of the Cambria Iron Company have recently put in are operated by a 100-horse-power Westinghouse engine.

PITTSBURGH AND VICINITY.

The Linden Steel Company, Limited, have just completed their 20-inch plate and sheet mill. This, with their 18-inch plate and sheet mill, 18-inch bar mill, 10-inch merchant mill and their large blooming mill, gives them admirable facilities for filling all orders in their line promptly. The company certainly deserve congratulation for the progress they have made since their organization.

The work of rebuilding the burned portion at the works of Everson, Macrum & Co. is progressing, and will be finished in a few weeks. The bar and guide rolls are in this portion. The first repairs after the fire were made to the engine and boilers, and the sheet rolls have been set in motion on triple turn.

The Ihmsen Glass Company, on the South Side, are making some great alterations to their factory, which will be ready to be lighted next month. The Atterbury Glass Company's works, on the same side, will be set in motion next Monday.

Hussey, Howe & Co. have ordered a second automatic engine of the Westinghouse Machine Company for use in their rolling mill. It is of 125 horse-power. They have had in use one of the same size for over a year, day and night, which is coupled direct to a 6-inch three-high train of rolls, rolling steel. It makes 340 revolutions, and has been indicated as high as 180 horse-power.

The certificate of organization of the Pittsburgh Plate Glass Company has been filed in the Recorder's office. The capital stock is $600,000, divided into 6000 shares of the par value of $100 each. The works of the company are to be located in East Deer township, where 100 acres of property, upon which are erected suitable buildings, have been purchased. The shareholders are Edward Ford, 2850; Emory L. Ford, 500, and Albert E. Hughes, 100 shares, all of Creighton, Pa.; James H. Shields, New York, 250 shares; John Scott, 1000; John Pitcairn, Jr., 1000; Miller & Nelson, 200, and Charles W. Batchelor, 100 shares, all of Pittsburgh. The property purchased belonged to the New York City Plate Glass Company, and there are two natural gas wells upon it, which will be used in the process of manufacturing glass. The works are located at Creighton Station, on the West Penn Railroad. The sale amounts to but little more than a change of name.

VIRGINIA.

According to the *Virginias*, the Low Moor Furnace, of the Low Moor Iron Company, went into its second blast September 3, 1882. From that date to January 1, 1883, it made 8117 tons of pig iron, and from January 1 to July 31, 1883, it made 23,218 tons, making an output of 32,035 tons in the 312 days from September 23, 1882, to July 31, 1883, or an average of 102.7 tons for each day of the blast to date named. This first built of the large blast furnaces of Virginia is now working in a most satisfactory manner, turning out daily from 115 to 120 tons of high-grade pig iron, about half of it No. 1 and half No. 2.

OHIO.

Col. A. L. Conger, receiver of the Akron Cutlery Works, sold the works, including machinery, stock, &c., last week. The property was purchased by Charles W. F. Dick, for $10,300. A new company will be organized and the works again operated.

New machinery is being put in by the Falls Rivet Company, Cuyhoga Falls, made necessary by the increase of business.

The work of shipping the machinery of the Canal Dover Rolling Mill to Niles, by the Reeves Brothers, is going rapidly forward.

The Struthers Furnace, which is part of the iron plant of Brown, Bonnell & Co., is still banked and will probably not be started until prices advance.

At Columbus, last Saturday, was incorporated the Cleveland Safe Company—capital stock, $50,000—with A. M. Claflin, Thos. Pratt, Levi T. Scofield, W. H. Dunn and John Coon as incorporators.

One sheet mill of the New York and Ohio Iron and Steel Company, at Ironton, is running double turn.

Monitor Furnace has been banked up.

Work at the new Kelly Nail Mill, Ironton, is progressing rapidly, and considerable of the machinery in the rolling department has been set up.

ILLINOIS.

The Chicago Screw Company are purchasing additional machinery for their works.

The McCormick Harvesting-Machine Company, of Chicago, are taking their annual inventory, and are cleaning up the machinery in their works preparatory to starting on their next year's business.

Mr. E. T. Hutchinson, late of the Chicago Tack Company, at Grand Crossing, is erecting a large and substantial building, to be used as a tack factory, on South Chicago avenue, near the Lake Shore and Michigan Southern Railroad tracks.

The Union Foundry and Pullman Car-Wheel Works, of Chicago, have a contract to furnish the structural iron for the new Pullman office building in that city. These works are melting about 100 tons of pig iron a day, and will at once take up the manufacture of the Shaw locomotive for standard and narrow-gauge roads.

Parties have been at Grand Crossing lately with a view of starting up a new sewing-machine factory in the old Wilson factory. They expect to be running by November.

The Elgin National Watch Company, of Elgin, have made a very sensible provision against accidental breakages of shafting, &c., about the works. They have purchased a Westinghouse engine of 40 horse-power, which is kept as a relay, and, on occasion, is hauled to any part of the factory, as needed, bolted to the floor, connected to the nearest steam-pipe, belted to the shaft in any convenient manner by the use of split pulleys, and set to work. Meanwhile the necessary repairs to the shafting are perfected. The company also have two other Westinghouse engines of 30 and 40 horse-power at regular service in other parts of their works.

The blast furnaces of the Joliet Steel Company are running steadily. The converting mill and rail mill, which started up on the 23d ult., are making 175 tons of rails at a turn, or 350 tons every 24 hours. This company intend making some important improvements to their converting mill before long, and are at present employing 800 men. —*Chicago Industrial World.*

MISSOURI.

The Brownell & Wight Car Company, of St. Louis, have added a new steam hammer to their machine-shop plant. They are very busy on street cars.

F. Niedringhaus & Co. are very busy at their Granite Iron Rolling Mills.

The Whitman Agricultural Company, of St. Louis, are very busy on hay-presses and other agricultural machinery, and are very much behind on their orders.

The Brown & Adams Manufacturing Company, of St. Louis, contemplate an increase on their capital stock, and will probably make extensive additions and improvements to their works.

MICHIGAN.

It is announced by the Fond du Lac papers that the blast-furnace there, built by C. J. L. Meyer some 12 years ago, and idle ever since, will go into blast on October 1 next. This furnace is one of the finest in the country, though we cannot help regarding its location as a mistake, as both ore and fuel will have to be brought to it, and from something of a distance, while, there being no home consumption for the metal produced, that will also have to stand its share of freight charges before reaching the consumer. Labor may be cheaper there than at most furnace locations, it is true, but with modern blast-furnaces that item in the cost of producing pig is by no means the most formidable; and the Fond du Lac furnace is, we take it, a very "modern" concern, having been built by a lumberman and manufacturer who—albeit a shrewd business man and brimful of enterprise—had no previous practical familiarity with the iron business.—*Marquette Mining Journal.*

The Martel Furnace, at St. Ignace, has been doing excellent work since going into blast on August 1.

COLORADO.

The Bessemer Rail Mill, at Pueblo, have taken a contract for steel rails for the Chicago, Burlington and Quincy Railroad, which will keep them busy for three months. The company have just finished a supply of rails for the Denver and Rio Grande extension.

Smoke Abatement in Cincinnati.

Mr. Clement Olhaber, who some time since resigned the difficult and thankless office of Smoke Inspector of Cincinnati, has been instrumental in securing a better wording of the law for the suppression of the smoke nuisance, and the amendment is now under consideration in the City Councils. The following is the text of the proposed new law:

An Ordinance to Amend an Ordinance entitled "An Ordinance to Abate the Smoke Nuisance and to Provide for an Inspector," passed November 2, A. D., 1881.

Be it ordained by the Common Council of the city of Cincinnati, that the ordinance entitled "An Ordinance to Abate the Smoke Nuisance and to Provide for an Inspector," passed November 2, A. D., 1881, be, and the same is, hereby amended as follows:

SECTION 1. That every furnace employed or to be employed in the city of Cincinnati, and every furnace upon railroad engines used for switching or yard purposes within the city limits, shall be so constructed, or, if already constructed, shall be so altered, and shall have attached thereto efficient smoke preventives, as to produce the most perfect combustion of fuel or material from which smoke results, and so as to prevent the production and emission of all smoke therefrom, so far as the same is possible; and if any person or persons, association or corporation being the owner, lessee, or having the control of such furnace, shall hereafter within the city limits use or allow any such furnace to be used which shall not be so constructed, or, if already constructed, shall not be so altered, or shall fail to have attached thereto efficient smoke preventives, so as to produce the most perfect combustion of the fuel or material from which smoke results, and so as to prevent the production and emission of all smoke therefrom, so far as the same is possible, every such person or persons, association or corporation shall be deemed guilty of an offense under this ordinance, and upon conviction of such offense before the Police Court of this city, shall be fined in any sum not less than $20 nor more than $50, and for each repetition of such offense shall be fined not less than $50, nor more than $100, the fine thus collected to be paid into the City Treasury to and for the Street Repairing Fund. Provided, however, that no conviction shall be had under this section for failure to alter any furnace already constructed or to have attached thereto efficient smoke preventives until 30 days shall have elapsed after the passage of this ordinance.

SECTION 1 (*a*). That every person having charge of the igniting, making, stoking, feeding or attending any furnace or furnace fire in the city of Cincinnati, whether stationary or used upon railroads, shall so ignite, make, stoke, feed and attend such furnace fire, and keep such furnace in such order and repair that the least possible smoke shall be produced and emitted therefrom, and shall keep each and every appliance attached to such furnace for the prevention of smoke in efficient order and operation and properly attached, and any person having charge of the igniting, making, stoking, feeding, or attending any such furnace fire who shall fail or neglect to so ignite, make, stoke, feed or attend such furnace fire, that the least possible smoke shall be produced or emitted therefrom, or shall fail or neglect to keep each and every appliance attached to such furnace for the prevention of smoke in efficient order and operation and properly attached, shall be deemed guilty of an offense under this ordinance, and on conviction of such offense before the Police Court of Cincinnati, be fined in any sum not exceeding $50. All fines thus collected to be applied into the city treasury to and for the credit of the Street Repairing Fund.

SECTION 1 (*b*). It shall be the duty of the Mayor and members of the police force of Cincinnati, in connection with the Inspector of Smoke, to keep constant watch and supervision over all places where smoke is produced or emitted, and such police force shall notify the Inspector of Smoke of all such places, and, in connection with such inspector, shall enforce a strict compliance with and obedience to this and all other ordinances of the city of Cincinnati in relation to the prevention of smoke.

SECTION 4. Section 1 of the Ordinance No. 3263, passed November 2, 1881, be and the same is hereby repealed.

SECTION 5. This ordinance shall take effect on and after the earliest period allowed by law.

Slack as a Puddling Fuel.—The Pittsburgh puddlers are showing decided objection to the use of slack in their furnaces. The *Times* of that city says: The puddlers are kicking against the use of slack in the puddling furnaces, as it entails, so they claim, considerable extra work. Whether the move of the puddlers is a sympathetic one, growing out of the constant complaints of the miners, or whether they think they see a favorable opportunity of having the slack thrown out by refusing to use it, and thereby encourage the miners to insist on being paid for producing it, thus tending make its use unpleasant for the manufacturers, remains to be determined. In any event, it is a fact that the growing increase of its use has been viewed with alarm by the puddlers; so much so that at their last convention it is alleged that an effort was made to put the convention on record as being radically opposed to slack. It is even asserted that a date was fixed for making a demand on the manufacturers in the first and sixth districts, which includes Pittsburgh, Youngstown and vicinity, to dispense with slack in the puddling furnaces. Oliver Bros. & Phillips have taken the lead in remodeling their mills so as to utilize slack exclusively. The men have taken the matter in hand and have brought it to the attention of the firm. It appears that the puddlers in the Tenth street mill are divided on the matter, and the regular mill committee have been ignored. In view of the extensive improvements which Oliver Bros. & Phillips have introduced, the point is raised that the objections, if any, ought to have been raised before the firm expended thousands of dollars. The fact that the coal bills have recently been more closely looked into by the iron manufacturers is one reason why they take the slack, which costs but a trifle. Immediate action is expected on the part of the puddlers.

According to a correspondent of the London *Times*, there are now altogether six lighthouses and one light vessel in the Red Sea; four of these are in the Gulf of Suez, and of the remaining three, one—that upon the Brother Islets—is not yet lighted. Between the Dædalus Shoal and Perim Island, a distance of more than 800 miles, there is no light at all; and though for 600 miles, after leaving the Dædalus, there are no dangers in the track of steamships, after that the sea is studded with islands and rocks which render the navigation difficult and dangerous, especially on dark and hazy nights. The places which are more especially dangerous are Jibbel Zukur Island and the Mokha Shoals. On Jibbel Zukur Island there are now the remains of three or four large steamers which have been wrecked there during the last year or two. By placing a lighthouse on Abu Ait Island, three miles to the eastward of the northern point of Jibbel Zukur, and a light vessel on the Mokha Shoals, the navigation of this most dangerous part of the Red Sea would be rendered much more safe and easy. For homeward-bound ships there is also a great necessity for a light on the southeast end of the Shadwan Island, as a guide to the entrance of the Straits of Jubal. With the great increase of the traffic through the Red Sea which has taken place during the last few years, it is now high time that there should be some improvement in the lighting of this great highway to the East. We may point out that the Canal Company are now extensively adopting Pintsch's fixed and floating gaslights for the canal entrance and elsewhere, and no doubt will soon employ them in the Red Sea, where they are very much wanted.

We find it stated in a contemporary that recent investigations relative to the condition of the wire-rod trade in Great Britain and on the Continent point to a decided falling off in the English trade—the Continental industry, on the other hand, holding out flattering prospects. In support of this view it may be remembered that during the last twelve years no less than twenty English firms in the trade, including some of much importance, have suspended payment, and of the remainder it is very doubtful whether anything like a fair percentage have made much money. On the other hand, there have not been more than half-a-dozen failures among German firms, and these have been far more than counterbalanced by the erection of new works and the extension of those already existing. Every year there is evidence of fresh inroads on British trade by German houses. An English firm fails, but no new house enters to take its place, and neither does the bulk of the business remain with producers. It is secured by the Germans. In fact, the stoppages above mentioned represent a dead loss to English trade, for not only have no new works been started to supply their place, but the existing firms have rather reduced than increased their production, notwithstanding that the consumption of wire has increased enormously.

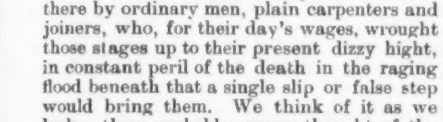
The Michigan Central Bridge at Niagara.

A correspondent writes as follows: The best point from which to obtain a general view of the progress of the whole work is from the footway of the older suspension bridge, midway of the span. I wish to dispense with figures as much as possible, in order to present a general view, but it is necessary to remember that we stand here about 230 feet above the water, and that this is about the hight of the almost perpendicular bank. We also learn that the distance between the piers of the new bridge, from side to side, will be 464 feet, and these last figures necessarily represent about the width of the mad torrent of water that goes roaring down from its leap over the precipice two miles above. I say necessarily, because the piers rise nearly from the water's edge. The new bridge is to be about 10 rods above the other. Commencing our view from the standpoint selected, we see just in the rear of the top of the bank on either side a small army of workmen engaged with derricks lowering timbers and blocks of stone to the scaffolding below, where they are in turn swung off by another derrick on their descent of nearly 200 feet to the workmen at the piers below. Further back from the top of the cliff other gangs are at work excavating for foundations and preparing to lay the great masses of stone masonry that are to confine the ends of the cantilever, which will balance and support the whole structure. The quantities of dressed stone, timber and steel lying about the grounds give the spectator some conception of the size of the work

Dropping the eye about 25 feet from the top of the bank, we see a huge scaffolding from 150 to 200 feet high, and reaching out from the bank fully 100 feet, or enough to overtop the piers, which stand, as already stated, almost at the water's edge. It makes one hold his breath to look from one side of the river to the other at those two huge scaffoldings, and think that they were erected there by ordinary men, plain carpenters and joiners, who, for their day's wages, wrought those stages up to their present dizzy hight, in constant peril of the death in the raging flood beneath that a single slip or false step would bring them. We think of it as we look; they probably never thought of the danger, but went right on in a business-like way and did their work. A dummy engine stands near the edge of each scaffolding and a derrick at the edge. More men—lots of them—are at work about these machines, and as the great timbers and blocks of stone swing out over the abyss and go down slowly and steadily, the eye is captured by the sight and follows the descent till they reach their destination at the foot of the scaffolding. Here more men are at work, swarming like ants about the piers. These piers are of stone—four of them on each side of the river—their bases resting on foundations which will endure as long as the everlasting hills. Viewed from our standpoint these piers look small, and it is only by comparing their hight with that of the ants around them, which we know to be men, that we convince ourselves that they are of some size. We learn that they are, in fact, each 40 feet in hight. From these the steel towers will rise to and above the top of the bank, and the shape and symmetry of the work will be rapidly disclosed. The general description which I have given of the work on the bridge as it appears to day relates to both sides of the river. While the work on the American side is said to be the more advanced, the only indication of it from this general view is that two of the stone piers on the Canada side are minus their capstones. Some accidents have occurred to laborers here; more will probably occur, as the work is prosecuted in continual risk of life and limb. But it goes steadily on. The contract calls for $1000 forfeit for each day that its completion is delayed beyond Dec. 1, 1883, and the unprofessional spectator, observing with amazement what has been thus far accomplished in the teeth of tremendous difficulties and in defiance of the forbidding situation, is quite ready to believe that the bridge will be finished "on time."

Wheelwright's Tool for Drilling and Countersinking Tires.

We present in the accompanying engraving an ingenious tool brought out by the Wiley & Russell Mfg. Company, of Greenfield, Mass. It is specially adapted for wheelwrights, being capable of drilling and countersinking tires in one operation, and is made of a superior quality of steel. The countersinking tool is pierced to hold the drill, which may be readily adjusted accord-



Tool for Drilling and Countersinking Tires in One Operation.

ing to the depth of hole wanted. The drill piercing the tire and felloe, and the countersinking tool following, the job is finished in a single operation, without the trouble of adjusting tools and work twice. The tool is now supplied in the following sizes: ⅛, 5/32, ¼ and 5/16, with round shanks ½ inch or ⅝ inch in diameter.

There is a formidable array of electrical interests combined to solve the problem of removing from the streets and buildings the unsightly poles and wires now covering the lower part of the city. Numerous complaints have led to the formation of an organization of 25 electrical companies, exclusive of the Western Union, who propose to remove the poles and wires and to replace them with an underground system. A committee has been formed for the promotion of the end sought, and circulars relating to the subject have already been issued to electricians in this country and abroad, with the object of concentrating inventive genius upon the problem. It is proposed to ascertain the most practicable plan, and to have compulsory legislation requiring all electrical companies to conform to that plan; and it is intended to make the plan so obviously the best that not even the powerful influence of the Western Union Telegraph Company can prevent the enactment of such a law.

LATEST LEGAL DECISIONS.

TENANTS IN COMMON—PARTITION OF REAL PROPERTY.

One of two tenants in common, as the land could not be divided, brought an action against his co-tenant to compel a sale of the land, and had a judgment to that effect. The defendant carried the case—Johnson vs. Olmstead—to the Supreme Court of Errors of Connecticut, where the judgment was affirmed. Judge Pardee, in the opinion, said: "No person can be compelled to remain the owner with another of real estate, not even if he become such by his own act; every owner is entitled to the fullest enjoyment of his property, and that can come only through an ownership free from dictation by others as to the manner in which it may be exercised. Therefore, the law afforded to every owner with another relief by way of partition, and this regardless alike of the difficulties attending separation and the consequences to his associate. Rights to the use of running water, rights to dig ores, have been declared subject to this law. But, inasmuch as it might sometimes happen that by partition the property would be practically sacrificed, the statute has opened a way of escape from such a result. It permits a court of equity to order a sale, when in its opinion a sale will better promote the interest of the owners. Therefore, since the passage of the statute there have been two modes of relief within the power of the court—partition and sale. Every owner with another is entitled to separate ownership by one of these; by partition first, and always if that is possible; if it is not, then by sale, every petitioner for a sale assuming the burden of proving a partition impossible, and if upon such petition the impossibility of partition is proven, the court is as much bound to order a sale as it would have been to order a partition upon a prayer for it, and upon proof that it could be conveniently and equitably made. If upon a petition for a sale it is proven both that partition is impossible and that a sale would result in a diminution of income, the petitioner is not for that reason to be shut up to continued joint ownership; he must have leave to go out of the possible door, notwithstanding that diminution; upon such petition the most that plaintiff or defendant can insist upon is that the undeniable right to severalty in ownership shall be secured by the least injurious of the two specified modes."

SET-OFF—PARTNERSHIP AND PRIVATE DEBTS.

C brought an action against P. K. & Co. on the check of G, and the bank set up two defenses: 1. That the partnership of which G was a member was indebted to them in a sum more than the amount of his account, and that they had set off his credit against their debt. 2. That the balance to the credit of G was less than the amount of the check, and that C could not cover as assignee of G, unless the check passed to him the credit claim of G. The defendants succeeded below, and the plaintiff carried the case—Coates vs. Preston—to the Supreme Court of Illinois, where the judgment was affirmed. The Chief Justice, in the opinion, said: "1. Debts, to be the subject of set-off, must be mutual between the parties to the action. That is not the case here. The debt offered to be set off is the debt of the firm against the claim of one of the individual partners, and this cannot be done. 2. The bank was under no obligation to pay any sum on the check unless the drawer had sufficent money on deposit to his credit with which to pay the check in full. It is plain the present plaintiff could not recover for a moiety of the check. That would be a division of the claim which the law will not allow. A very different question would be presented if G himself was the plaintiff here. The plaintiff could only recover, if at all, on the check, and if the drawer did not have a sufficient sum on deposit in defendants' hands with which to make full payment, so as to take up and hold the check as a voucher, they were under no obligation to make a partial payment, and could rightfully refuse to pay the check, or any part of it, as they did."

ACCIDENT INSURANCE—INVOLUNTARY ACTION—UNCONSCIOUS CONDITION OF MIND.

In an action to recover the weekly indemnity upon an accident policy—Scheiderer vs. Travelers' Insurance Company—the complainant stated that "when it was quite dark, and while he was in a dazed and unconscious condition of mind, and not knowing or realizing what he was doing, he involuntarily arose from his seat and walked unconsciously to the platform of the car, and, without fault on his part, fell therefrom to the ground and was thereby injured." The company insisted that they were not liable for this casualty, as it was not accidental, but the result of the action of the plaintiff. The trial court sustained this position of the defendant, and the plaintiff appealed to the Supreme Court of Wisconsin, where the judgment was reversed. Judge Orton, in the opinion, said: "It is not necessary to wander away and get lost in 'that wilderness more dark than groves of fir on Huron's shore'—the wilderness of the mind—to ascertain the precise condition of the mind of the plaintiff, as stated in the complaint, when the accident occurred, and it is useless to speculate as to the remote causes of that condition—whether drunkenness, utter prostration, somnambulism, brain disease or derangement of the faculties—beyond, aside or in contradiction of the complaint. The allegations of the complaint show a cause of action against the company. What occurred happened, it is stated, while the plaintiff was unconscious, and that his action was involuntary. These are the strongest words which could be used to negative self-infliction, design or voluntary exposure, which are the only conditions material to the case which exempt the company from liability. In respect to the causes of this mental condition of the plaintiff, it must also be accepted as true that he went to sleep from weariness and the motion of the cars, and never awoke to consciousness or volition until the injury had happened. It is evident that he was entirely irresponsible."

Handling Freight in England.

Mr. Edgar Worthington, writing to the Railroad *Gazette*, devotes a long article to the subject of freight handling, and the methods employed in England. In this country we are, in a vast number of cases, far behind the age in machinery and appliances of all kinds for the purpose, and hence the subject is of the highest interest:

It is not very long since the stout oaken capstan on board ship was the only representative of its kind, when the Scotchman with his bagpipes sat in the middle encouraging the sailors with his musical drone to "heave in" at the capstan, and thus weigh the anchor. But now not only the sailor, but railway men and many others, including the man who moves his house along the street in some Western city, all know and make use of this mechanical device to haul great weights.

But it is with capstans in freight-yards and warehouses with which we have now more especially to deal. And not with those which are turned by hand, but those where the hand of man has only to make a couple of turns of rope round the iron capstan, and watch the iron muscles of the little laborer do the work.

There are two styles of capstans in common use in England—those driven from underground shafting, and those driven by separate engines, generally by hydraulic power. The former are connected by bevel gear to the main shafting, and are constantly running as long as the engine is at work. The head of the capstan is often made of two pieces, the upper part, which receives all the wear of the rope, being made of chilled iron and screwed on to the lower half, which is not worn by this friction, and is therefore more permanent. The shaft on which this head is keyed passes down through a square casting, which is firmly bolted to a stone or brick foundation by four stout bolts. A long bearing piece is fixed to this casting for the shaft to revolve in; and a bevel-wheel is keyed on the lower end of the shaft, which is geared into a smaller bevel-wheel on a horizontal counter-shaft, which is in its turn driven from the main shafting. In this manner as many as a dozen capstans may be driven from the same engine, each capstan, when worked alone, being able to exert the full power of that engine. These power capstans are, however, dropping out of use on account of the misuse of the great power possessed by them, which frequently results in a broken rope, or, still worse, a broken limb, and hydraulic capstans of various makes have taken their place.

Among the earliest of these, still much in use, was a capstan made by Sir William Armstrong. A little hydraulic engine of three oscillating cylinders placed side by side was firmly fixed to the ground below the capstan, and was made to drive the latter through a pair of reducing bevel-wheels. The cylinders were stout brass castings, and the water pressure acted only on one side of the piston or ram. The valve chests and valves were also of brass, and all the fixed joints in the pipes and machinery were made of guttapercha. Another successful method was that of making the three cylinders work directly on to three cranks in the capstan spindle.

But the most generally adopted type is that resulting from an application of the Brotherhood three-cylinder engine to the capstan. In this compact combination a cast-iron pillar inside the capstan-head forms a long bearing for the capstan spindle. At the lower end of the latter, immediately below the bedplate, is a single crank on which three cylinders work, ranged at angles of 120° with one another, these cylinders being of iron, cast in one piece, and bushed with phosphor-bronze. The rams are of brass or phosphor-bronze, having a long bearing in the cylinder, and each is packed with a cup leather, which is the universal packing for hydraulic cylinders, ingeniously arranged so that the pressure of water behind the ram opens the cup leather, and forms a tight joint with the cylinder. Unless these cup leathers are perfect in size and quality, the rough usage of a capstan, or the admission of sand with the water, will soon find out the defect, through which the water, at 750 pounds pressure per square inch, will soon be running to waste. These cup leathers are generally made of the best thick leather, and are pressed into the required shape between cast-iron dies. The three connecting-rods which work on the one crank above mentioned, and which are always subjected to compression, owing to the cylinders being single acting, are made of cast iron, and, as in the case of the Westinghouse engine, they can, for the same reason, be run at a very high speed.

The distribution of water to these cylinders is effected by one valve placed vertically below the center of the capstan and driven by means of a brass disk on the lower end of the crank. The valve is of brass, and is circular. It contains a pressure port opening on its under side into the valve chamber, where the water is admitted from the pipes, and an exhaust port conducting the water from the cylinders, each in turn, back through the center of the cylinder casting, whence it is conveyed in return pipes to the engine-house, or to waste, as the case may be. This distributing valve is 5¼ inches in diameter, and the face upon which it revolves is of lignumvitæ, a wood which has been found by its self-lubricating qualities to withstand the great pressure better than any metal, especially where grit is liable to pass through with the water. The port holes in this lignumvitæ face are 1 inch in diameter, and are bushed with short pieces of brass tubes, which keep their edges perfect. It is a point of great importance in this valve that there should be no lap; that the pressure should be on the rams during the whole of their forward stroke, and that it should then be instantly cut off and the exhaust port quite as instantly opened. Many hydraulic engines are fitted with a small relief valve in the water passages, through which any confined water may find its way back to the valve-chest, if, from any cause, the valve should not open soon enough. But in these Brotherhood capstans there is no such relief valve, the main valve itself being forced off its seat in case of over-pressure in the cylinders. Some of these capstans, after being in use for a considerable time, gave signs of being out of order by stopping suddenly. This behavior was for some time unexplained, until it was found to be owing to the gear which drives the valve getting a little worn, and thus not opening the exhaust exactly at the end of the stroke. This little defect was easily remedied, but it shows how necessary it is to provide a prompt and reliable outlet to water, which is so inelastic that, if confined, it will either stop the machine or have a disastrous effect at the weakest part of the structure.

The whole of this self-contained capstan, including the hydraulic engine, which we are considering, is made complete in the shops, and is then ready to be dropped on to a stone or brick foundation, which is provided with a manhole to facilitate the examination of joints or the renewing of the cup leathers. The starting and stopping of the capstan is effected by an ordinary spindle valve with a conical seat, which is opened by the foot through treadles placed on both sides of the capstan, and which is closed by weights. All the necessary levers connecting these two treadles with the valve, being four in number, are attached to the under side of the foundation plate. Instead of providing access to the engine by means of a manhole, some of these foundation planks are arranged on a hinge so that the whole capstan can be tilted up above the ground, thus enabling repairs to be more easily effected than in the necessarily confined space of a manhole. This is no doubt a great convenience, and shows the advantage of paying special attention to the get-at-ability of parts of machinery which, like the capstans, are kept so much warmer and safer when they are well confined underneath the ground.

There are many other little points of interest in the capstan above described which it would be useless to attempt to describe further without the aid of drawings to illustrate the details. Many of these details appear absurdly strong to an eye accustomed to steam machinery only, but water at 750 pounds per square inch pressure cannot be kept within bounds by the same means as steam at 60 pounds. When well constructed, they are an immense convenience in a freight yard, being a great and safe power in a small space. Each capstan can pull 10 loaded cars, or 150 tons, and no more, its power depending entirely on the pressure of water supplied. Hence lighter ropes can be employed than those which were necessary when locomotives or other powerful machinery did the work, and thus the labor of carrying ropes about the yard is very much reduced.

The hydraulic cranes with which warehouses are stocked are generally of a light construction; especially if a secure fastening can be found overhead, in the roof or wall, where a shoe forming a pivot for the pillar can be secured, in which case the crane can be more conveniently and lightly constructed, and at the same time more clearance can be provided underneath the jib. In most cases the cylinder forms part of the pillar of the crane, the water being conveyed to and from it through a pipe in the center of the shoe. This is, however, a very exposed position for the cylinder, and in the case of cranes which stand in the open air, it is either cased in with wrought-iron plates or placed entirely underground. At the Holyhead docks a very complete system of hydraulic machinery was put down five years ago. There the warehouse cranes stand in the openings of a stone wall and have thus a secure fastening for the top and bottom of the pillar. The jib reaches out through this opening over the vessel, and slews from that position across a platform containing a weighing machine, over to the railroad cars on the other side of the platform. The cranes are of wrought iron, and the cylinders are placed underneath the platform at such an angle as to enable the ram to sink back into the cylinder by its own weight when the crane is empty and lowering. These cylinders are of double power, which is effected in the following manner: The ram of the main lifting cylinder is itself a cylinder containing a smaller ram. This smaller cylinder is the one generally used, the larger ram being kept in its place by a catch, which can be released when the larger power is required for a heavier lift. The slewing cylinders are placed side by side, their rams being connected by a chain which passes round the base of the pillar, and their valves are closed automatically when the jib has reached the limit of its swing. The slewing cylinders are among the most valuable features in hydraulic cranes, for they place the jib completely under the control of the operator, thus enabling him to turn the crane round while in the act of lifting, and to deposit its burden at any given point in the circle of its range with the least possible delay.

There are different ways of varying the power of hydraulic cranes, one being that of varying the ratio of the pulleys in the lifting ram, and another being an ingenious device invented by Mr. Mills, by which the power of the two slewing cylinders can be united to that of the lifting cylinder by means of a simple chain connection and an increased stroke of the rams. But none of these complications are regarded with very general favor, because it is found that simplicity in working a crane is of more value than a little saving of water. In all hydraulic machinery it is usual to provide an air cock at the highest point to which the water rises, in order to allow the air to escape on admitting water for the first time. And, as before mentioned, it is important to burn gas-jets near the cylinders or other exposed parts during cold weather. With these precautions it is found that hydraulic machinery is perfectly reliable, and, as I have already endeavored to illustrate, it is in very general use throughout the warehouses, docks and freight-yards of England.

The use of gas as a motive power in large warehouses has been successfully tried in several parts of England, and its adaptability to places where gas is cheap deserves attention. The engines, of which the Otto silent gas engine is the most prominent example, are placed on the upper floors of warehouses, or wherever they are nearest their work, and the chief advantage over the steam engine lies in the absence of a boiler, or, indeed, of any visible fuel, and also in the little attention consequently required. Their advantage over the hydraulic system consists mainly in their being unaffected by the coldest weather and in their economy of power, of which the hydraulic system is necessarily so wasteful. As to the all-important question of economy, however, everything depends on the price of gas, which, it may be mentioned, is as low as 75 cents per 1000 feet in some of the English cities.

A word about the lighter elevators which are used so largely in the hotels and large buildings of America for passengers and light freight may not be out of place here. The accidents which have from time to time happened to such elevators have made the British public very much afraid of them, especially of those worked by rope gear. A little more confidence seems to be placed in those actuated directly by a hydraulic cylinder sunk in the ground, which gives a more visible and direct support to the cage than where the latter is suspended by ropes only. But the larger amount of friction and the slow movement of such elevators take away their real value for passenger purposes, and if such were placed in the Mills Building, or other large office buildings in New York, in place of the rapidly-moving elevators which are at work there now, I fear that most of those who now make frequent use of them would walk upstairs. These direct-acting elevators have been made up to a great hight, the ram of one of them being 4¼ inches in diameter, and having a stroke of 79 feet. In this case, however, the weight of the cage was balanced so as to take as much dead weight as possible off so slender a ram. The water pressure used in such elevators varies from 30 pounds to 800 pounds per square inch. But passenger elevators are not used in England to anything like the extent they are in America. There seems again to be a general mistrust of all the various forms of safety apparatus, which have so often failed to act when most needed, so that the public in general prefer the exertion of walking up many flights of stairs to the slight risk of trusting themselves in the elevator, and it appears that the British public will remain of that opinion until something simpler and safer be introduced.

I have found it necessary to make frequent reference to the lorries or carts which do all the work of carrying freight through the streets. These are usually flat, and substantially built, and have no sides or ends beyond the few inches of sill to keep the load from slipping off. They are mounted on four strong wheels, which have often a tread of 6 inches in width, and weigh altogether from 15 to 36 cwt., as the load they are constructed to carry varies from 3 to 14 tons. Similar wagons, with sides and ends, are in use on rougher roads in the country, which weigh as much as 23 cwt., and which will carry 3 tons of coal. The lighter freight traffic of the streets is carried in two-wheel carts usually made without springs, which are often loaded with as much as 30 cwt. of coal. The horses which draw these carts and lorries are usually of a very heavy build, and often weigh as much as 16 cwt. each. When a horse weighs more than 19 cwt. he is considered a very fine animal. It will thus be noticed that in the streets, as in the warehouses, and on the railroads, the methods of handling freight in England differ widely from those in general use in the United States. The difference lies chiefly in the substantial nature of the fixed plant in the older country, which is due largely to the greater abundance of capital there.

My main object in writing these letters has been to indicate some of the methods by which large quantities of freight are handled in England, and more especially the aid which hydraulic power has afforded in the operations of transferring it between ship and lorry and railroad car as rapidly and at the same time as cheaply as possible. Whether this power can be applied in the United States to the same extent as it is in England is a matter for experiment to decide. But considering the severe winters which the machinery has already safely endured, I see no insuperable difficulty in the way of its more general adoption, even in the Northern and Eastern States of America.

At a lecture lately delivered at the Civil Service Institution in London, Colonel Fosbery created a sensation by suddenly drawing from its place of hiding, under the table, a wonderful new gun, which he had just brought from Liège. He called it a "baby electric gun." It looked like a pretty carbine, but it had no mechanism and could not possibly go off until connected up to the source of electric force. This done, it could be fired with amazing rapidity, 104 rounds having a few days before been fired from it by its inventor, M. Pieper, of Liège, in two minutes. Colonel Fosbery fired two rounds with infinitessimal powder charges. He had prepared himself by secreting under his vest a small circuit of wire and putting on a banderole, supporting what looked like a two-ounce vial, but was, in fact, an electric accumulator, with sufficient stored-up energy to discharge 2000 rounds. The cartridges were innocent looking mites, and contained no detonating substances—nothing, in fact, but simple powder and a wad.

The Consul-General of the United States at Rome, under date of July 31, has furnished the Department of State with an account of a series of contests between combined reaping and binding machines, manufactured in several countries, in which those of the United States were successful. The tests were severe, the ground being in many places marshy and stony. The result clearly showed the superiority of the American machines. There were only two prizes offered for combined reapers and binders, and both of these were won by American machines. The first of these, consisting of $200, a gold medal, a diploma and the purchase of two machines, was awarded to the McCormick machine. The second, $100, a silver medal and diploma, was awarded the Messrs. Warder, Bushnell & Gessner. The Consul-General calls attention to the benefits resulting from American representation at such exhibitions, and to the promising field in Italy for the introduction of agricultural implements of American manufacture.

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For Hardware and other merchandise by a good Salesman, now manufacturing a small line pertaining to Window Blinds chiefly. Prefers to sell on commission to accepting salary of $10,000 (Ten Thousand Dollars per annum.) With description of articles name lowest price for largest lots, where now selling, and extent of sales. Well posted in city, throughout the United States and Canada, and parts of Europe. Address Box 3465, Boston P. O., Mass.

Notice.

I am in business in Chicago and employ traveling salesmen. I desire to represent manufacturers of Brass and Iron Goods for Railroads, Engine Builders, Plumbers, Gas and Steam Fitters, Tools, Metals, Tin Plate, Tubing and Wire, Steam Packing, Patent Machines, &c., &c. I will either a tas agent or carry goods in stock at liberal discounts. Best references. Address

PURCHASING AGENT,
Care of the Chicago Smelting and Refining Works, Nos. 64 and 66 So. Canal St., Chicago.

WANTED.—Salesmen for Pennsylvania, Eastern and Southern States. Must be familiar with Cutlery and kindred branches. Answers must give references, age, and salary required.

Address "CUTLERY."
Office of *The Iron Age*, 83 Reade st., New York.

A GENTLEMAN

of ability and experience is open to negotiations as Manager or Buyer for Hardware or House-furnishing Goods.

Address "THOROUGH, 62,"
Office of *The Iron Age*, 83 Reade St., New York.

J SEIDEL.

Commission Merchant,

Box 662,

HABANA, CUBA,

Will be happy to accept the representation of first-class houses manufacturing hardware.

Reference:
COLLINS & CO., 212 Water Street, New York.

To Lease.

From May 1, 1884, for a term of years, at a low rental to satisfactory parties the manufacturing property at New London, Conn., lately occupied by the Brown Cotton Gin Company. The ground comprises over 80,000 square feet. The buildings and sheds under roof measure over 25,000 square feet, of which about 20,000 feet are metal roofs. An Engine, Boiler, shafting, &c., &c., are on the premises. The property is very conveniently located for manufacturing purposes. Its entire easterly line is bounded by the land of the Shore Line Division of the N. Y., N. H. and Hartford R. R. Co.

For further particulars, apply to
Messrs. J. C LEARNED & SON,
New London, or to
B. HAXTUN,
172 Centre st., New York.

Valuable Property for Sale.

Machine Shop, Foundry, Blacksmith Shop, with Forge Hammer; Saw Mill, Paint Shop, Two Dwelling Houses, with all necessary out-buildings, including 18 acres of land and water right. Situated on Antietam Creek, a never-failing water-power, three miles south of Wayne-boro', Franklin Co., Pa. Will be sold on easy terms.

Apply to GARVER, FOLTZ & CO.,
Hagerstown, Md.

Wanted.

Pig Iron Salesman, experienced in the Western trade. A liberal salary given to good man.

Address "PIG IRON, 57,"
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Superintendent Wanted,

to take charge of all departments of an Open Hearth Steel Plant. A rare opening for the right man. Address "STEEL,"

Lock Box 238, Pittsburgh, Pa.

Wanted.

An Iron and Brass Molder, as partner, with $5000 or more, to start a Foundry with my Machine Shop, at Galveston, Texas. For further particulars, write to

JESSE ASTALL, Proprietor,
West Strand Iron Bolt and Nut Works,
Galveston, Texas.

Wanted.

An experienced Foreman to take charge of Foundry doing a general Malleable Iron business.

Address "CUPOLA 66,"
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Wanted, To arrange with some party to manufacture on royalty, or to buy outright, English Patent No. 4329, for Friction Clutch; also Canadian Patent No. 16,566.

These patents have been thoroughly proved in America, and are recognized as the standard. We are now doing a profitable business of $50,000 per annum. Address D. FRISBIE & CO.,
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TO INVENTORS AND MANUFACTURERS.

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of the American Institute of the City of New York will open October 31, 1883. Heavy machinery will be received as early as may be found pretty other goods. September 25th. Intending exhibitors must make early application to secure proper space and classification. For blanks and information, address

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Wanted.

POSITION AS ENGINEER.

An Engineer and Constructor of Iron Works is open for a new engagement after the 1st of October next. Address

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A 25-lb. Bradley Cushioned Hammer, second-hand. Address, with particulars,

SITES & GILL,
222 and 224 So. Third Street, Philadelphia, Pa.

ROLL TURNER WANTED

For a Steel Bar and Plate Mill. Must be a thoroughly competent man.

State experience and wages expected.

Address "STEEL,"
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LIST OF NEW MACHINERY FOR SALE.

1 Engine Lathe, 20 ft. bed, 42 in. swing.
1 " 18 " 36 "
1 " each 14, 16 and 18 ft. bed, 30 in. swing.
1 " each 10 and 12 ft. bed, 27 in. swing.
1 " each 8, 10 and 12 ft. bed, 23 in. swing.
1 " each 8, 10 and 12 ft. bed, 19 in. swing.
1 " 8 ft. bed, 18 in. swing.
1 " each 6 and 8 ft. bed, 16 in. swing.
1 " 6 ft. bed, 15 in. swing.
1 " 5 " 11 "
2 Iron Planers, to plane 10 ft., 30 x 30 in.
2 " to plane 7 ft., 26 x 26 in.
2 " to plane 4 ft., 22 x 22 in
1 each 22, 24, 26, 30 and 38 in. swing B. G. S. F. Upright Iron Drills.
1 Shaper, each 10 and 15 in. stroke.
2 Shapers each 12 in stroke.
2 Bolt Cutters, to cut 1½ and 2 in.

Send for lists of new and second-hand Tools.

The Geo. Place Machinery Company,
No. 121 Chambers and 103 Reade Sts., New York.

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PHILADELPHIA HYDRAULIC WORKS.

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For terms &c., apply at No. 407 Library St.

For Sale—Lathes and Machinery.

15 in. x 6 ft. second-hand Engine Lathe, $175; 15 in. x 6 ft. Lathe, used two months, $200; 16 in. x 6 ft. new first-class Lathe, $275; 18 in. x 7 ft. new first-class Lathe, $330; 24 in. x 12 ft. new first-class Lathe, $500; Drill, and Lathe Chucks for same, very low. 20 in. Drill Press, new design, $100; 38 in. Back-geared Drill Press, new, $210; Planer Chucks, Hand and Power Presses, Nut Tappers, Bolt Cutters, Headers, &c.

S. M. YORK,
Cleveland, Ohio.

For Sale.

One Dead-Stroke Justice Hammer, 15 lbs.
" " " " " 50 lbs.
One Allen Governor, 4-inch.

Address BLACK DIAMOND FILE WORKS,
G. & H. BARNETT,
21 to 43 Richmond St., Philadelphia, Pa.

SCHOOL OF ENGINEERING, Vanderbilt University.

NASHVILLE, TENN.

TUITION, $65 PER ANNUM.

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CIVIL ENGINEERING,
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Send for circulars and detailed information to
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Patentees desirous of introducing their inventions

Into the English Market,

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Wholesale Merchants and Factors for Engineers' and Ironmongers' Goods.)

NOTE.—All quotations must include free delivery to London or Liverpool.

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Wholesale Hardware Auctioneers,

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Sales held weekly for the trade. Consignments solicited. We refer to the leading manufacturers and importers.

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HEAVY CASTINGS AND ROLLS.

Wanted to buy Old Heavy Castings and Rolls of all kinds. Address

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Notice.

I will sell 200 Shares Stock of the Chicago Tire and Spring Works, or any part of the 200 Shares, to the highest bidder; Shares, $100 each. This is the best paying stock in Illinois. No reasonable offer refused, and warranted genuine.

Address LESLIE IRON WORKS,
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CORRESPONDENCE SOLICITED

from parties intending to purchase Steam Riveters, Steam Hammers, Hydraulic Presses, Heavy Punch and Shears, &c., &c.

Estimates given for good work very low.

CONTINENTAL IRON WORKS,
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Wanted.

Superintendent for a Malleable Iron Foundry; one who is up to all the latest improvements, and competent to superintend the construction of a new plant. This is a first-class opening for the right man. Address

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WM. WILLIS MERRILL,
4 Stone Street, Room 69.
Dealer in
EXCHANGE MEMBERSHIPS.

POSITION WANTED—An experienced Traveler, having no desirable position until January 1, would like to engage with some good house, on the road or in store, until above date. Would continue longer if everything proved satisfactory. Best of reference. Address "TRAVELER,"
Care of 97 Ontario st., Cleveland, Ohio

NEW AND SECOND-HAND MACHINERY.

1 Engine Lathe, 30 in. swing, 18 ft. bed, 2d hand.
1 Engine Lathe, 36 in. swing, 20 ft. bed, New.
1 Engine Lathe, 34 in. swing, 17 ft. bed, New.
1 Engine Lathe, 34 in swing, 9 ft. bed, New.
2 Screw-cutting Gap Lathe, 26 in swing over bed, 45 in. swing over gap; bed 24 ft. long. New.
1 each Engine Lathes 26 in. swing, 10 ft., 12 ft., 14 ft., 16 ft., 20 ft., 24 ft. bed, New.
2 Engine Lathes, 24 in. swing, 9 ft. bed New.
1 Engine Lathe, 23 in. swing, 16 ft. bed, 2d hand.
1 each Engine Lathes, 22 in. swing, 6 ft., 8 ft., 10 ft. 12 ft. bed, New
1 each Engine Lathes, 20 in. swing, 6 ft., 8 ft., 10 ft., 12 ft. bed, New.
1 Engine Lathe, 20 in. swing, 8 ft. bed, 2d hand
1 each Engine Lathes, 19 in. swing, 7 ft, 8 ft, 10 ft. bed, New.
4 Engine Lathes, 19 in. swing, 6 ft. bed, Nearly new
1 Engine Lathe, 19 in swing, 7 ft. bed, 2d hand.
1 each Engine Lathes, 17 in. swing, 6 ft., 7 ft., 8 ft., 10 ft. bed, New.
1 Engine Lathe, 17 in. x 7 ft. bed, 2d hand.
1 Engine Lathe, 15 in. swing, 9 ft. bed, 2d hand.
2 " 15 " " 6 " " New
1 " 14 " " 6 " " 2d hand.
1 " 13 " " 6 " " New.
3 " 13 " " 5 " " "
1 " 12 " " 5 " " "
1 " 11 " " 5 " " "
1 " 10 " " 4 " " "
2 Hand Lathes, 15 in. x 5 ft. bed. New.
1 " 13 in. x 5 ft. bed, 2d hand.
1 " 13 in. x 4½ ft. bed, New.
1 " 12 in. x 4 ft. bed, New.
1 " 11½ in. x 4 ft. bed, New.
1 " 11 in. x 5 ft. bed, B. G. 2d hand.
1 " 10 in. x 3 ft. New.
1 Single Head Lathe.
1 Bench Lathe, 8½ in x 3 ft. bed, New.
Foot Lathe, 8½ in. x 3 ft bed, New.
1 Foot Lathe, 12 in. x 4 ft. bed, New.
1 Foot Lathe, 8 in. x 3 ft. bed, Back-geared.
1 Foot Lathe 8 in. x 2 ft. 8 in bed, New.
1 Turret Lathe and Chuck. 2d hand. 16 in. x 5 ft.
1 Axle Lathe, New.
1 Planer to plane 31 in. x 30 in x 6 ft. 2d hand.
1 Planer to plane 44 in x 32 in. x 12 ft. 2d hand.
1 Planer to plane 32 in. x 32 in. x 8 ft. Nearly new.
1 Planer to plane 27 in x 27 in. x 7 ft. New.
1 Planer to place 24 in. x 24 in. x 8 ft. New.
1 Planer to plane 24 in. x 24 in. x 6 ft. New.
1 Planer to plane 24 in. x 24 in. x 5 ft. New.
1 Planer to plane 22 in. x 22 in. x 5 ft. New.
1 Planer to plane 20 in. x 20 in. x 4 ft. New.
2 Planers to plane 16 in. x 16 in. x 3 ft. New.
3 Crank Planers New.
2 Shapers, 15-in. stroke, 23-in. traverse. New.
1 Shaper, 8 in. stroke. New.
1 Shaper, 6 in. stroke. New.
1 Shaper, 12-in. stroke, 33-in. traverse. New.
1 Shaper, 12-in. stroke, 18-in. traverse. New.
2 Shaping Machines, 7-in. stroke. 2d hand.
1 Back-geared Milling Machine. New.
1 Milling Machine, with Arm. New.
1 Lincoln Miller. New.
1 Hand Milling Machine. New.
1 Miller and Screw Slotter, combined.
1 Double Face Miller. New.
1 Automatic Milling Machine. New.
1 40-in. Radial Drill. New.
1 48 in. " "
1 42-in. swing Upright Drill, B. G. & S. F. New.
3 24 inch Up. Drills. Bk. Gr. and Self Feed. New.
1 20-inch Lever Feed Upright Drill. New.
1 20-inch Lever and Wheel Feed Upright Drill. New.
1 Sensitive Drill New.
1 Pratt & Whitney 4-Spindle Drill. 2d hand.
1 Garvin's 4 Spindle Drill. 2d hand.
1 4-Spindle Drill Press. New.
1 3 " " " "
1 2 " " " "
1 Single Spindle Light Drill, Table Feed. New.
2 Bench Drills, Lever and Wheel Feed.
1 Single Spindle Profiler. New.
1 Two " " Light. New.
1 No 2 Screw Machine, wire feed. New.
1 Screw Machine. New. Not wire feed.
1 " Slotter. "
1 Cutter Grinder. "
6 Emery Grinders. New.
1 Slitting or Circular Shear. New.
4 Tapping Machines.
1 Upright Bor. and Turn. Mill, 10 ft 4 in. swing. 2d h.
1 12-in. Slotting Machine, 50-in. swing. New.
1 8-in. " 30-in. swing. New.
1 Hydraulic Wheel Press for 72-in. Wheels. New.
1 13 ft. Bending Rolls. 2d hand.
1 Squaring Shear, 22 in. New.
3 Power Presses. New.
1 Foot Press. New.
1 Screw Presses. New.
1 Drop Press. New.
1 Hand Lever Punch. 2d hand.
1 Lot Heavy Polishing Frames 2d hand.
3 Shafting Straighteners. New.
1 8 x 8 Upright Engine. New.
1 10 x 12 Horizontal Stationary Engine. New.
1 9½ x 12 in Horizontal Stationary Engine. New.
1 5 in. x 6 in. Horizontal Stationary Engine. New
1 5 x 12 Horizontal Stationary Engine. 2d hand.
1 10 H. P. Cylinder Boiler. 2d hand.
1 10 H. P. Upright Boiler. New.
1 10 H P. Upright Boiler. 2d hand.
1 No. 6 Steam Pump. 2d hand.
2 Grindstones and Frames. New.
1 48 in Blacksmith Forge. 2d hand.
1 Lot 15 in. Smoke-stacks. 2d hand.

Wood-Working Machinery.

1 Saw Table. New.
1 Double Saw Bench. New.
1 24-in. Surfacer Rotary Bed. New.
1 Band Sawing Machine. New.
1 Scroll " " "
1 Rod Machine. Self Feed "
1 Sandpapering Machine. 2d hand.
1 8-in. Molder, 4 sides. 2d hand.
1 Edge Molding Machine. 2d hand.
1 Large Lot 2d-hand Pulleys, Hangers, &c.

And lot of others, both new and 2d hand.

If the list does not contain what you want, write us.

J. M. BADGER & CO.,
49 DEY STREET, New York City.

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HARDWARE AND STOVE BUSINESS

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A pocket manual of useful information for Mechanical Engineers, Steam Users and Mechanics, containing 224 pages (size 4 Nonpareil type) of carefully selected data, formulæ and experimental investigations from the latest and most approved sources. Published by WM. A. HARRIS, builder of Harris-Corliss Steam Engines, Providence, R. I., to whom all subscriptions for copies should be sent.

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A Shipping Clerk for a mill rolling shape iron. Must be active and industrious and understand the business. Address "A. A. A."
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32 in. x 21 ft.; Planer, 32 in. x 7 ft.; large Upright Drill, Tools and other Machinery, second-hand, for sale low by A. PURVES & SON,
South and Penn sts., Philadelphia.

New & Second-Hand Machinery.

FEB 21, 1883.

1 Engine Lathe, 14 in. x 5, 6, 7 and 8 ft. Grant & Bogert
1 " " 26 in. x 12 ft., Grant & Bogert. New.
1 " " 45 in. x 15 ft. Good order.
1 " " 36 in x 12 17 ft. New.
1 " " 42 in. x 14 ft. New.
1 " " 14 in. x 6 ft Star Tool Co. New.
1 " " 14 in. x 6 ft. New.
1 " " 14 in. x 5 x 6 ft. New.
1 " " 16 in. x 7 ft. Bridgeport. New.
1 " " 13 in. x 5 ft. and 6 ft. Ames. New.
1 " " 16 in. x 6, 7 and 8 ft. Ames. New.
1 " " 18 in. x 8 and 10 ft. Lodge & Barker. New
1 " " 27 in. x 10 in. Lodge & Barker
1 " " 22 in x 12 ft. New.
1 " " 20 in. x 10 ft. New.
1 " " 28 in. x 16 ft. New.
1 " " 24 in. x 12, 14 and 16 ft. New.
1 " " 11 in. x 4 ft. and 5 ft. Prentiss. New
1 " " 12 in x 5 ft. Young. New.
1 Plain Engine Lathe, 16 in. x 4 ft. New.
1 " " 14 in. x 4 ft. New.
1 Fox Lathe, 15 in x 5 ft., Am. Tool & Machine Co.
1 15 in. x 4 ft. Turret Lathe Lodge & Barker.
1 Fox Turret Lathe, 16 in. x 6 ft. Lodge & Barker. New
1 Planer, 40 in. x 40 in. x 12 ft Good order.
1 " 32 in. x 32 in. x 7 ft. Good order.
1 " 16 in. x 16 in. x 3 ft. New.
1 " 22 in. x 20 in x 5 ft. New.
1 " 24 in. x 24 in. x 6 ft. Hendey. New
1 " 26 in. x 26 in. x 7 ft New.
1 " 16 in. Lever Table Drill. New.
1 Crank Planer 16 in. x 16 in. x 13 in. New.
1 16-in. Upright Drill. New.
1 20-in. " Prentiss. New.
1 24-in. " Prentiss. New.
1 20 in. " Prentiss. New.
1 25-in. swing B. G. & S. F Drill. Blaisdell. New
1 28-in. " " " " "
1 38 in. swing B. G. & T. F. Drill. New.
1 15-in. Shaper. Gould & Eberhardt. New.
1 10-in. Shaper. Gould & Eberhardt. New.
1 15-in Shaper. Hendey. New.
1 24 in. Shaper. Hendey. New.
1 24-in. Shaper. Hendey. Good order.
1 9-in. Shaper. Bewes & Phillips. New.
1 9 in. Shaper. New.
1 14-in. Shaper.

Full Assortment of Milling Machines, Spindle Drills, &c., of Garvin's. New. [& Lamson.
1 each Nos. 2 and 4 Screw Machines, Wire Feed. Jones
2 No. 2 Lincoln Millers. Good order.
2 No. 2 Lincoln Millers. New.
1 Hand Lathe, 12 x 4, 5 and 6 ft. New.
1 Hand Lathe, 16 in. x 6 and 7 ft. New.
1 Boring and Turning Mill, 42 in., 2 Heads. New.
1 each 5 and 7 spindle Nut Tappers. New.
1 Gig Saw. Good as new. Rowers.
1 700-lb. Steam Hammer. Ferris & Miles. Good order

New York Agency of
THE TANITE CO. and GRANT & BOGERT MACHINE TOOL WORKS,
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For Sale.

"ACME" BOLT CUTTERS.

6 Single Bolt Cutters, cutting from ¼ in. to 1 in.
3 Single Bolt Cutters, cutting from ⅝ in. to 1¼ in.
12 Single Bolt Cutters, cutting from ½ in. to 1½ in.
2 Single Bolt Cutters, cutting from ¾ in. to 2 in.
2 Single Bolt Cutters, cutting from ¾ in to 2½ in.
1 Single Bolt Cutter, cutting from 1 in to 3½ in.
6 Double Bolt Cutters, cutting from ½ in to 1½ in.

With or without Automatic Motion.

NUT TAPPERS, BOLT POINTERS, &c.

Specialist in All Kinds of

BOLT and NUT MACHINERY.

NOVELTY IRON WORKS,

CLEVELAND OHIO.

For Sale.

The Industrial Works of Shamokin, owned and successfully carried on for a number of years by the late Wm. Brown deceased, consisting of Foundry and Machine Shop, and a large stock of Patterns regarded as part of the property. Boiler Shop, Blacksmith Shop and Factory for the manufacture of heavy coal screens. Well located in the borough of Shamokin, Pa., with the best facilities for shipping by rail, and surrounded by a district contributing all the work that a shop of that kind can possibly turn out. Easy terms of payment are offered to suit a purchaser of limited capital. For list of Tools and further particulars apply to

WM. McILVAIN & SONS,
Manufacturers of Boiler Plate and Tank Iron,
Reading, Pa.

For Sale.

Stock of Hardware, Stoves and Tinware, in one of the best towns in Southern Minnesota; population about 1000, and growing rapidly. Nice clean stock; will inventory about $6000; satisfactory reasons for selling. Address

W. F. RUMSEY,
Albert Lea, Minn.

For Sale.

Foundry situated at 2028 N. 10th St., Philadelphia. In good running order. 147 feet front on 10th St. and 120 feet back on Alter St. Room for fifteen moulders. Plenty of work, good locality and good customers. For further particulars, address

WM. FLESH, 2028 N. 10th St.,
Philadelphia, Pa.

Reason for selling out, retiring from business.

For Sale.

One Granulator, with attachments.
One large mixer, with attachments.
One No. 5 Vacuum Pump.
Two Sugar Packers.

The above is a portion of the Machinery formerly used at Baltimore Steam Sugar Refinery, Baltimore, Md. For information apply to

GEO. B. GRAHAM,
P. O. Box 689, Baltimore, Md.

For Sale.

NEW HORIZONTAL STATIONARY ENGINES.

One 10 Horse-Power	$ 275.00
One 15 Horse-Power	325 00
Three 20 Horse-Power, each	300.00
One 25 Horse-Power	402.00
Two 30 Horse-Power, each	537.00
Two 35 Horse-Power, each	611.20
One 40 Horse-Power	665 60
One 60 Horse-Power	1031.20
One 70 Horse-Power	1184.80

For further particulars, address
MERWIN McKAIG,
Engine Builder,
Cumberland, Md.

FOR SALE.

Nos. 1 and 6 Sturtevant Blowers; No. 2 do. Exhaust; Vertical Engines, 2 and 12 H. P.; Roper Hot Air do, 1½ and 3 H. P.; Otto Gas do., 1 H. P.; Roper Pumping do., 6-in.; Baxter do., 4, 6 and 10 H. P.; Planer, 20 x 16 x 4 (fine), $200.; do., 29 x 29 x 5 (Chain), $200.; Engine Lathe 30 x 14, $300; Crane, 1 ton; 84-in Cupola. Purchases carefully made for parties at low rates.

C. R. BIGELOW, M. E.,
18 New Church St., New York City.

Mixed Screws in Bulk.

Packed in cases of 150 to 200 lbs. each. For price, address

GEO. E. WEAVER,
Olneyville, R. I.

Trade Report.

BRITISH IRON AND METAL MARKETS.

[*Special Cable Dispatch to The Iron Age.*]

LONDON, WEDNESDAY, Sept. 5, 1883.

Scotch Pig.—The market is steadier. Makers' brands are quoted as follows:

Coltness,	alongside,	Glasgow	59/6
Langloan,	"	"	59/6
Gartsherrie,	"	"	56/6
Summerlee,	"	"	57/6
Carnbroe,	"	"	55/
Glengarnock,	"	Ardrossan	55/
Eglinton,	"	"	49/
Dalmellington,	"	"	49/
Shotts,	"	at Leith	59/

Lighterage from Ardrossan to Glasgow is 1/ ₱ ton.

Cleveland Pig—There is a better feeling in the market and prices are a little firmer. We quote as follows, f.o.b. shipping ports:

Middlesboro'	No. 1 Foundry	43/6
"	No. 2 "	41/6
"	No. 3 "	39/ @ 30/6
"	No. 4 Forge	38/

Bessemer Pig.—The market continues dull and weak, with no change in quotations. W. C. Hematites are quoted 49/ @ 50/ for mixed lots, Nos. 1, 2 and 3, f.o.b. shipping ports.

Blooms.—Nothing doing.

Manufactured Iron.—The market continues irregular. We quote at works:

		£	s.	d.		£	s.	d.
Staff. Ord.	Marked Bars	7	10	0	@	.....		
"	Medium "	6	5	0	@	6	15	0
"	Common "	6	0	0	@	6	5	0
Hoops, 20 W. G. and over.								
"	Common Best	7	0	0	@	7	5	0
"	Medium	6	5	0	@	6	15	0
"	Common	6	10	0	@	.....		
Sheets, 20 W. G. and under.								
"	Ordinary Best	8	15	0	@	9	5	0
"	Common	8	0	0	@	8	5	0
Welsh Bars		5	5	0	@	5	7	6

Steel Rails.—The market is irregular. Ordinary Sections are quoted £4. 15/ @ £5. 10/, f.o.b. shipping ports.

Iron Rails—Dull and nominal. Welsh, 30 lb. and upward, are quoted, nominally, £4. 15/ @ £5. 10/, f.o.b. shipping ports.

Old Rails—Are a little firmer. We quote Old D. H.'s, £3. 12/6 @£3. 15/, c.i.f. New York.

Scrap.—The market is steadier. Heavy Wrought is quoted £3. 5/ @ £3. 7/6, c.i.f. New York. Bessemer Crop Ends are quoted 60/ for run of mill, f.o.b. shipping ports.

Copper—Is without change to note. Best Selected is quoted £68. 10/ @ £69. 10/, and Chili Bars, £63. 15/ @ £64.

Tin.—The market is a little firmer. Straits Ingot, spot, is quoted £94 @ £94. 15/, and futures, £94. 5/ @ £94. 15/.

Tin Plates—Are irregular. Quotations are:

Tin Plates, 10 x 14,	1st qual.	Charcoal	19/6	@ 21/6
" "	2d "	"	18/6	@ 19/
" "	1st "	Coke	17/6	@ 18/
" "	2d "	"	16/	@ 16/6

Spelter.—The market is irregular. We quote Ordinary, £14. 17/6 @ £15. 2/6 at shipping ports.

Lead—Is quiet and unchanged. Common English Pig is quoted £12. 10/ @ £12 15/.

Freights.—Steam from Glasgow to New York, 5/6 @ 6/6; Liverpool to New York, 4/ @ 5/; Liverpool to Philadelphia, 5/ @ 6/6, and London to New York, 7/6 @ 9/6.

TRADE AND FINANCE.

Office of *The Iron Age*,
WEDNESDAY EVENING, Sept. 5, 1883.

In the general markets the volume of business continues moderate, although there is evidence of more spirit, and, in some quarters, increased activity. This is partly due to the return of business men from their summer vacations, and to the revived spirit of speculation caused by a break in the prices both of grain and produce, which have sold more freely. There also appears to be more confidence in the stability of values. The fall trade seems at last to be fairly under way, as indicated by the lengthened lists of names on the hotel registers and the pressure of actual buyers among our business houses, the latter more especially in the line of dry goods. Reports from a distance are also encouraging. At nearly all centers in the Northwest a seasonable trade is in progress, although the wheat harvest, now nearly completed, has caused much interruption, and accounts from the South are favorable. Bank clearings of this city the past week show a decrease of 15.4 %, compared with the corresponding week last year, while the gross clearings in 27 cities, outside of New York, show a decrease of 6.9 %. There is a gain, however, on the week immediately preceding. A merchant representing a leading house states that his salesmen, who have recently returned from various sections of the country, agree in believing that a large and healthy trade during the next few weeks may be expected. The principal drawback is the comparatively quiet movement in exports, but crop advices, together with accounts from abroad, afford assurances that a large surplus of domestic products will be available on export account, and eventually can be marketed at remunerative prices. *Bradstreet's* reports only 126 failures in the United States during the past week—53 less than the preceeding week, 16 more than the corresponding week of 1882, and 22 more than the same week of 1881. The number reported is the smallest for any single week since October 14, 1882, and there were none of any importance. Compared with the previous week the decrease is principally in the Western States and Territories.

The local monetary situation is unchanged. 2 @ 2½ % being the ordinary rate for money on call, and 60 to 90 days' indorsed bills receivable are quoted 6 %; four months' acceptances, 6 @ 6½ %. There is a better demand for commercial paper, several city banks being in the market. The weekly statement of city banks shows an increase of $121,900 in specie and $17,750 in circulation, and a decrease of $104,200 in legal tenders. The banks gain $402 200 in surplus reserves, which raises the amount held above legal requirements to $6,224,005.

On the Stock Exchange business is more active, with advancing prices. There is more buying for local investment, also on European account. The advance in several leading specialties, compared with one week ago, is about 2 @ 4⅛, the latter Union Pacific. Advantage has been taken of a large short interest, much of which still remains uncovered. On Thursday some of the lowest quotations were touched, the decline being quite heavy, but on Friday there was a rally, attributed to an improved investment demand. On Monday the market was strong to buoyant, with the Villard shares, the Vanderbilts, the coal shares, Central Pacific and Wabash the special features, and the position has not essentially changed. The upward movement is mainly speculative, aided by favorable crop reports. The most disagreeable fact in the week was the default of the Ohio Central Railroad Company upon the interest on the first mortgage bonds on the Erie division, due September 1. The principal dealings to-day at the close were in Northwestern, which advanced to 127, Louisville and Nashville to 50⅜, Canada Southern to 56, Oregon and Transcontinental to 66½, Wabash to 34¼, Northern Pacific common to 41⅞, Denver to 26¼, Jersey Central to 82½, Reading to 51¼, Union Pacific to 93⅝. In the final dealings a part of this advance—⅛ to ¼—was lost.

The exports of domestic produce from this port during the past week, though considerably less than for the previous week, approximate the usual average, the total being $7,172,696, against $7,578,611 for the corresponding week last year. Since January 1 the exports aggregate $241,002,506, against $225,850,703 for the corresponding period last year. The imports of merchandise at this port during the week were below the usual average, the total being $8,131,822, of which $5,503,491 represents general merchandise and the remainder ($2,628,331) dry goods. The total is $570,506 less than that of the week before. Since January 1 the imports aggregate $313,368,341, compared with $342,242,769 for the corresponding period of 1882. The exports, exclusive of specie, were $248,865 in excess of those of the previous week, and the total since January 1 is $233,829,810, against $218,272,092 for the corresponding months last year. According to the Custom House reports, the importations of specie and bullion at this port during week the ending August 31 were $638,717, consisting of $507,755 in gold and $130,962 in silver, as against a total of $195,275 for the week ending August 31 last year. The importations of specie since January 1 amount to $10,942,111, as against $2,582,757 for the corresponding months in 1882. The exports of specie for the week amounted to $465,047, bringing the total since January 1 up to $10.353,476.

The Electric, Manufacturing and Miscellaneous Stock Exchange of New York, for which numerous memberships have been secured during the week, aims to be a complete mart where all securities embraced under the title, "Electric, Manufacturing and Miscellaneous," may be dealt in, a market value established and transactions recorded with equal facility as those listed upon the New York Stock Exchange.

Our city trust companies report an increase of $18,739,008 in their deposits since July 1, 1882. The 12 companies have a capital of but $12,700,000, and a net surplus of $12,028,314; yet their assets were nearly $158,000,000 on July 1, 1883, when they had advanced over $98,000,000 on collaterals, nearly $9,000,000 on personal securities, and over $8,000,000 on bond and mortgages. The total debt of the United States on the 1st inst. was $1,888,022,751.31, less cash in the Treasury $351,503,986.22, leaving net $1,536,518,765.09. In August the debt was reduced $6,671,851.71, and since the 30th of June last the decrease is $14,572,442.39.

The leading dry-goods jobbers report that a general improvement is noticeable, as all sections of the country are represented in current transactions, and the average low prices induce liberal selections. Some of the dealers find that their August sales prove to be in excess of the corresponding month last year, despite the seeming caution with which purchases were made. Accounts from interior and Western markets represent that business is active, and among our local commission houses trade is of very fair proportions, as shown by the encumbered sidewalks. A notable fact in this line of business is that China's first cotton mill, now building, has awarded the contract for general furnishings to Brown Bros. & Co., Providence, R. I., whose prominence among the largest houses for mill supplies in the world is thus duly recognized.

The large blanket sale to-day drew buyers from all parts of the Union. On the Produce Exchange to-day there was another break, and the market for some leading articles was almost panicky. Pork and lard declined. Wheat is lower, under a pressure to sell, with little export demand. Flour tends downward, but corn is firmer, on account of low temperature in the West. Coffee is strong on a basis of 9¾¢ for Rio. Cotton is quiet but steady at the recent advance. Sugar is fairly active and steady on a basis of 6⅛¢ @ 6⅝¢ for raw. Tobacco is firm, on scarce supplies. Wool is without spirit, on a full stock. Ocean tonnage for petroleum, cotton, lumber and general cargo is wanted at steady figures—for cotton chiefly for forward loading at the Southern ports of outlet.

Government bonds closed at follows:

	Bid.	Asked.
U. S. 4½, 1891, registered	112¼	112½
U. S. 4½, 1891, coupon	112¼	112½
U. S. 4, 1907, registered	118⅜	118½
U. S. 4, 1907, coupon	118⅜	118½
U. S. 3 per cents	103¼	103½
U. S. Currency 6s, 1895	129	—
U. S. Currency 6s, 1896	130	—
U. S. Currency 6s, 1897	131	—
U. S. Currency 6s, 1898	133	—
U. S. Currency 6s, 1899	134	—

State bonds are steady to strong. Tennessee Compromise advanced to 43, North Carolina to 78½, and South Carolina 6's, Non-Fundable, to 4⅝. Missouri 6's of 1888 declined to 108½, and do. 6's of 1887 to 107½.

Sterling is quiet, and inclines to lower rates, as cotton bills will be looked for in a few days. Posted rates are $4.82½ and $4.86; commercial bills, $4.80 and $4.80½.

MINING STOCKS.

The closing quotations were as follows:

	Bid.	Asked.
Amie	13	15
Alice	1.90	....
Alta Mont	4	6
Belle Isle	25	....
Barcelona	33	....
B. H. & E., n	7.10	....
Caled. B H	....	55
Climax	6	9
Con. Imp	2	6
Con. Va	55	....
Chrysolite	1.10	1.15
Central Arizona	22	....
Dahlonega	2	3
Durango	4	....
Decatur	....	3
Eureka Con	7.00	....
Elko Con	14	15
Findley	7	8
Father de Smet	3.50	4.50
Gold Stripe	7	8
Horn Silver	7.00	7.37½
Hortense	6	10
Hall-Ander	....	1.05
Independence	....	55
Iron Silver	2.05	3.00
Leadville Con	30	....
Mexican	3.50	....
Navajo	2.75	3.00
N. Belle	5.87½	6.12½
N. Belle Isle	50	....
Robinson Con	42	43
Rising Sun	....	4
Red Elephant	....	8
Sierra Nev	4.10	....
Standard	5.25	5.62½
Silver Cliff	11	....
Sutro Tun	19	20
Stormont	22	....
Silver King	7.37½	....
Sierra Gr	99	1.05
Sonora Con	25	26
Union Con	5.00	....
Unadilla	1	....
Vizina	....	60

GENERAL HARDWARE.

Business goes on very much as for two or three weeks past. There is no great activity, and many buyers are waiting to learn more of the crop returns before deciding on their policy for the season, but in a quiet and steady way a good many goods are being marketed. In regard to the recent combination of the manufacturers of Steel goods, the result has been an abandonment of the combination, as far as Hoes are concerned, but not in the case of Forks, Potato Hooks, Steel Rakes, and Weeding Hoes, on which the prices and terms remain as originally established. The Executive Committee have been in session in this city during the past two days, and advices are that all difficulties have been adjusted, and the combination has a good prospect of success.

The supply of Nails does not increase, and the demand shows no decrease. The conditions which have prevailed for the past month apparently continue, and the future is regarded with confidence. It is believed that the Western factories will maintain prices, and little fear is expressed of danger from that direction, but there is, of course, no absolute certainty that the Western combination can be maintained. So long as the Western capacity greatly exceeds the demand there is danger of overproduction and lower prices. We continue our quotation of $3, with the usual abatement for large lots. The Atlantic States Nail Association will hold a meeting at the Oriental Hotel, Coney Island, at 5 o'clock on Thursday afternoon, the 13th instant.

The American Screw Company issue the following discount sheet, under date of the 1st inst., in which the changes are an advance in Tire Bolts and a reduction in Stove Bolts and Sink Bolts:

Flat Head, Iron, Wood Screws	55 %
Round Head, Iron, " "	50 %
Flat Head, Brass, " "	55 %
Round Head, Brass, " "	45 %

On Flat Head, Blued, 2½ per cent. will be added to net amount of invoice.

Iron Black, Iron Tinned, Block and Carriage Rivets	40 %
Rivets in Bulk	40 %
Burrs	40 %
Philadelphia Pattern Tire Bolts, Best Quality, Philadelphia List	75 %
Eagle Philadelphia Tire Bolts, Philadelphia list	8 %
Bay State Tire Bolts, New Common list	62½ %
Flat Head Iron Machine Screws	55 %
Round " " " "	50 %
Fillister Head Iron Machine Screws	45 %
Flat Head Brass " "	55 %
Round " " " "	50 %
Fillister Head Brass " "	40 %
Taps for Machine Screws	40 %
Stove Bolts	50 %
Sink Bolts	60 %
Pointed Wires	40 %
Tapped Nuts	40 %
Hand Rail Screws	70 %
Coach Screws, (by the keg 150 lbs.)	70 %

With special additional discounts for large quantities.

The double page advertisement of Mallory, Wheeler & Co. and of Sargent & Co., jointly, on pages 36 and 37 of this issue, il-

lustrates a new Tubular Dead Lock and Night Latch, Steel Key Mortise Lock, and Scandinavian Padlocks, manufactured by M., W. & Co.; also a sample of their newer style Escutcheon Door Knob and Bell Pull. Sargent & Co. show a few of the many designs of Builders' Hardware manufactured at their New Haven works. Sargent & Co. and Mallory, Wheeler & Co. use similar designs in their Bronze Metal and Imperial Bronze House Trimmings, so that their goods match in color, style and finish.

On our 46th page will be seen the advertisement of Smith's Patent Screw Staples and Hasps, which are only made in the United States by the Wheeling Hinge Company, who make the following announcement:

WHEELING, W. VA., Aug. 13, 1883.

To the Trade: Having been appointed sole licensees for the manufacture and sale of "Smith's Patent Screw Staples" in and for the United States, it affords us great pleasure to recommend them to the trade. We speak within bounds when we say we have made as many hasps and staples as any other manufacturer, and, although our goods have always compared favorably with others, we have heard numerous complaints of their inefficiency as a fastening. Ordinarily but one staple can be clinched; the other, going into solid timber, is easily pulled out. The Smith Staples cannot be pulled out, and it is easier to break the lock used with them than to break the staple; so that from being the weakest part of such a fastening, the staple is now the strongest part. It costs more to make, and will, therefore, always be higher in price; but wherever it is shown it will sell. For fastening founders' flasks they are unequaled, and we have already had quite a demand for them for that purpose. Soliciting correspondence, we are

Yours very truly,
WHEELING HINGE COMPANY.

The Saranac Horse Nail Company, whose advertisement will be found on our 24th page, in a recent circular speaks as follows of the manufacture of their Nails:

Selected brands only of Norway Iron of the very best quality are used in their manufacture, and in quality and superior finish they are guaranteed to be unsurpassed in the world, while the improvements introduced in our system of making enable us to offer them at lower rates and at greater discounts to the trade than can be offered by any other manufacturer. The principles and effects of hand-made Nails are fully retained in our process of manufacture, producing results which place the Saranac Horse Shoe Nail in the front rank of machine-made Nails, and establish its claim to pre-eminence for toughness, strength, freedom from flaws, and beauty and superiority of finish. Being hammered at nearly welding heat, they are firmer and tougher, maintaining the stiffness and ductility without deteriorating, but rather improving the quality of the Iron, producing absolute freedom from any tendency to sliver in driving, a cause of lameness and injury to so many horses. We shall abate no effort to maintain the present enviable reputation of our goods, and have every confidence that with skilled workmen in every department, and our long and practical experience in the business, we shall secure to our manufacture the indorsement and approval of all dealers and consumers. We invite correspondence, and shall be pleased to send samples to any address and furnish all desired information. These goods are in the hands of leading jobbing houses in every part of the United States, Mexico, Cuba and South America, and extensively exported to Europe.

Dodman & Burke, 100 Chambers street, New York, are the general agents for these Nails.

The Crystal Plate Glass Company, of St. Louis, give notice that bids for Polished Plate Glass will hold good only in the event of shipment being required after the 30th inst. They can receive no more orders for September delivery on account of the large amount of business already in hand for that month.

Chas. W. Pickering & Co., of Philadelphia, manufacturers of Railway Springs, have opened a branch office at 45 Boreel Building, 115 Broadway, New York, under the mangement of A. L. Rowe.

The catalogue and price list of the Tuck Mfg. Company, Brockton, Mass., is illustrated by a style of outline engravings which show the shape of the various goods in a very clear and neat manner. In some lines, such as "Mechanics Cutlery," the difference in shape of the blades is very well shown by overlapping diagrams. The following are their present list prices, from which a discount of 25 per cent. is taken. We quote from the catalogue: "All the goods comprised in this list are made from the best selected stock in the market. They are manufactured by skilled workmen of long experience, and are warranted to maintain their well-earned reputation."

PRICE LIST OF GOODS MADE BY THE TUCK MANUFACTURING COMPANY.

Screw-Drivers.

Length in inches.	New Pattern. Flat.	S. V. T. Pattern. Flat.	Round.	Piano.	"York" and Jewelers'.
	Pr. doz.	Pr. doz.	Pr. doz	Pr. doz.	Pr. doz.
1½	....	$1 60	$1.20	....	....
2	$2.00	1.80	1.50	$2.20	York,
2½	....	1.90	....	....	1½
3	2.25	2.00	1.70	2.40	to
3½	....	2.20	....	....	3 in.
4	2.60	2.40	1.90	2.80	$2.00
5	3.28	1.00	2.10	3.30	Jewelers'
6	4.00	3.60	2.30	3.80	2
7	5.20	....	2.50	4.30	to
8	6.00	....	2.80	4.80	3
9	....	....	3.10	5.20	$2.20
10	9.00	....	3.50	5.00	
11	....	....		6.00	....
12	11.40	....	4.40	6.40	....
14	....	....	5.40	....	....
16	....	....	6.50	....	....
18	....	....	8.00	....	....

Belt Awls	$2.00	per doz.
Regulators, 6-inch	1.68	"
Flat-handled Regulators	2.00	"
Scratch Awls, 2½ to 4½ inches	1.32	"
Stickers	1.32	"

Screw-Driver Bits.

4-inch Blade, Assorted Points	$2.00	per doz.
4¾ " " " "	2.20	"
7 " " " "	3.60	"

Reamers.

Square	$2.20	per doz.
Half-Round	2.40	"

Counter Sinks.

Flat, 3 inch blade	$1.80	per doz.
Twisted, " "	2.00	"

Stubbs' Currier Steels.

Under No. 30 wire, with Handles	$3.00	per doz.
" " " without "	2.00	"
Over " " " with "	3.50	"
" " " " without "	2.50	"

Buffer or Scraper Steels.

Round	$1.60	per doz.
Square	1.80	"

Silversmiths' Burnishers.

All ordinary shapes	$4.00	per doz.
Handles extra	.75	"

Oval Burnishers.

No. 1, 3½ inch blade	$3.20	per doz
No. 2, 4 " "	3.40	"
No. 3, 4½ " "	3.00	"

Shoemakers' Oval Burnishers.

Two Handles.

⅝ to ¾ inch wide	$15.00	per doz.
1⅛ to 1½ " " Nos. 1, 2, 3	33.00	"

Nail Sets.

Nos. 1, 2, 3, 4, Square	$1.00	per doz.
Nos. 1, 2, 3, 4, Round	1.00	"
Shoemakers' No. 4, Hollow Pt.	.96	"
Handled Round Chan'l, Hollow Pt.	1.00	"
" Flat " " "	2.20	"

Punches.

Nos. 1, 2, Center	$1.25	per doz.
No. 3, Pin	1.25	"

[For Small Round Solid Punches, see Rd. N. Sets.]

Cold Chisels.

3-16 and ⅛ inch	$1.50	per doz.
5-16 "	1.80	"
⅜ "	2.20	"
½ "	2.80	"
⅝ "	3.80	"
¾ "	4.80	"
⅞ "	5.80	"
1 "	6.80	"

Parting Tools.

½ inch	$1.50	per doz.
⅝ "	5.00	"
¾ "	7.00	"

Shoe Knives and Other Mechanics' Cutlery.

S. V. Tuck Stamp.

Nos.	Square Points.	Paring.	Hawk Bills.	Round Points.	Nar. Sq. Points.	Sharp Points.	Gothic Points.	Lance Points.	Per doz.
00	"	"	"						$1.92
0	"	"	"	"	"	"			1.92
1	"	"	"	"	"	"	"		1.92
2	"	"	"	"	"	"	"	"	1.92
3	"	"	"	"	"	"	"	"	1.92
4	"	"	"	"		"	"		2.40
4½	"		"			"	"		2.80
5	"								3.20
6	"								3.60

Guard Knives, Nos. 0, 1	1.02
Tip Knives, Nos. 0, 1	2.00
Blocking Knives and Clickers	2.00
Extension Blades, Nos. 0, 1, 2	1.40
Sole Leather Knives	3.60
Buffers, R. & L. Hand	3.60
Paper Hangers' Knives, No. 1, Eng. Pat.	3.20
" " " No. 2, Am. "	2.00
Cigar Makers' " No. 1, Eng. "	3.20
" " " No. 2, Cinn. "	1.60

Skivers.

5 inch Heavy, round or square point	$3.20	per doz.
5 inch Medium, round or square point	3.20	"
5 inch Narrow and Thin, round or square point	3.20	"
6 inch Heavy, round or square point	3.60	"
6 inch Medium, round or square point	3.60	"

Heel Knives.

Nos. 1, 2, Round Edge	$2.00	per doz.
No. 4 Breasting	2.40	"
" 5 "	3.60	"
" 6 "	4.00	"
" 1 Heel Choppers	4.00	"
" 2 " "	4.40	"

Black Diamond Shoe Knives.

Nos.	Square Points.	Paring.	Hawk Bills.	Sharp Points.	Per Dozen.
00	"	"	"		$1.50
0	"	"	"	"	1.50
1	"	"	"	"	1.50
2	"	"	"	"	1.50
3	"	"	"		1.50
4					1.80

Butcher Knives.

4½ Inch	$2.80	per doz
5 "	3.40	"
6 "	4.00	"
7 "	4.50	"
8 "	5.00	"
9 "	5.50	"
10 "	6.50	"
11 "	8.00	"
12 "	9.50	"
13 "	11.00	"
14 "	12.50	"
Oyster Knives	2.00	"
Mackerel Splitters	1.80	"
Bread Knives, English pattern	5.00	"

Miscellaneous Goods.

Birdseye Stamps	$1.20	per doz.
Last Hooks, Steel	1.00	"
Stationary Last Pullers	3.20	"
Burring Irons	2.20	"
Keen's Machine Heel Knives	....	"
Tripp Machine Welt Knives	....	"
Apple-tree Handles	....	"
Last Shave Blades	....	"

IRON.

American Pig.—The market seems to be in about the same condition as last week, with a slight tendency to improvement in the demand, but no change in prices. The best that can be said of it, however, must be put negatively. There are no lots pressing for sale; there is no apparent effort to dispose of outside Irons in this market, and there is no visible weakness. Inquiries are being made for quotations on good-sized lots, but it is too much to say that they will lead to business, although it is conjectured that buyers must very shortly lay in stocks for fall and winter work. We are approaching a pivotal point in trade, and either the demand will increase and prices stiffen, or concessions will have to be made to encourage buying. A favorable indication that bottom has been touched is the fact that customers who have refused to pay the prices asked, and have gone elsewhere, have in many cases returned and purchased at the current quotations. Few cheap lots are in the market, if any. We have heard of a sale of 1200 tons of Gray Forge Iron at a low price, delivered at tidewater here, but it was a speculative lot that had been held for a long time. We quote No. 1 Foundry $22 @ $23 for Lehigh and North River Irons, some special sales having been made at $23.50; inferior Irons are occasionally disposed of at $21 @ $21 50, but in exceedingly small quantities. No. 2 Foundry, $19.50 @ $21; Gray Forge, $18.30 @ $19.50; Mottled and White, $18. The transactions on the Metal Exchange during the week amounted to 1300 tons. The Secretary of the Exchange has received reports from 79 blast furnaces, which show 46,687 tons of Pig Iron in stock on September 1, against 48,433 tons on August 1; their production in August was 19,222 tons, against 19,944 tons in July. The following prices for 100-ton lots of Pig Iron, made of all ore, uniform mixtures, immediate delivery, for cash, are quoted by furnace sales agents:

NO. 1 FOUNDRY.

Hudson	$22.75
Carbon	22.50
Thomas	*22.00

GRAY FORGE.

Durham	$18.75
Pequest	18.75
Sterling	18 30

* To customers.

Scotch Pig.—The arrivals during the past week have been about as usual, but the market has been dull, with fewer transactions, and possibly one-third of the quantity received here has gone into store. Nevertheless, prices have been well sustained, there is no evident weakness, and dealers regard the future as favorable to increased trade. Quotations are as follows: Coltness, $23.50 from ship; Eglinton, $21 from yard; Summerlee, $.2 50, to arrive, and $23 @ $23.25 from ship; Langloan, $23.50 from ship; Glengarnock, $22, to arrive, $22.50 from ship, and $22.50 @ $23 from yard; Carron, $23 from ship; Carnbroe, $22, to arrive, $22.50 from ship, and $22.50 @ $23 from yard; Shotts, $23.50 from ship; Gartsherrie, $23 @ 23.50 from yard; Dalmellington, $20.75, to arrive, and $21 from ship.

English Pig.—A sale of several thousand tons of Bessemer is reported at a shade under $21. Inquiries are more numerous for this kind of Iron, and it is expected that, as bottom seems to have been reached, there will soon be a considerable business transacted. Some Spiegeleisen has been sold at $30.50 @ $30 75 for 20 %, but $31 is asked for additional lots now under negotiation.

Bar Iron.—Reports very generally indicate a slightly improved feeling, as compared with last week, consequent upon better sales and more inquiries. Stocks in warehouses are not heavy, and the mills are not pressing their Iron upon the dealers; even the Pittsburgh mills do not seem to be seeking orders here, while, on the other hand, complaints are still made that mills are slow in their deliveries. Prices are unchanged, and we quote as follows: Refined Iron, $2 30 @ $2.40 from store and $2 @ $2.20 from mill; Common Iron, $2.10 @ $2.20 from store and $1.75 @ $1.80 from mill.

Sheet Iron.—Trade continues to be very active for the heavy grades. We quote 3.1¢ @ 3.2¢ for No. 16 Blue Annealed. Lighter grades are quoted in our New York Wholesale Price List. It will be observed that there has been an advance in Russia Sheet Iron, which is in light supply.

Structural and Shaped Iron.—The demand for building material continues very active, and prices are firm. We quote Beams at 3 5¢, in round lots, delivered on the wharf; Angles, 2.75¢, and Tees, 3.25¢, out of store.

Plate Iron.—The demand keeps up very well, and prices are steady as last quoted, namely: Common, 2.6¢ @ 2.75¢; Refined, 2.75¢; Shell, 3⅛¢ @ 3¼¢; **Flange**, 4⅛¢ @ 4¼¢; Extra Flange, 5¢ @ 5¼¢.

Steel.—Business in Merchant Steel has fallen off, but prices are nominally as follows: American Tool Steel, 11¢; Crucible Machinery, 6½¢ @ 7¢; Bessemer and Open-hearth Machinery, 4¢ @ 5¢. Bessemer and Open-hearth Bar Steel is quoted by Iron mills at 3¼¢ @ 3½¢. The demand for Steel Boiler Plates is very good, and quotations range from 5½¢ to 6¢. English Tool Steel is quoted at 15½¢.

Wire Rods.—Transactions in Steel and Iron Rods have been quite small recently, but for different reasons. Last winter the Wire mills laid in a year's supply of Steel Rods in anticipation of an increased duty on them, and not only do the mills now hold a considerable stock, but the demand for Wire has also fallen off, and the stock of Rods will last longer than had been expected. Transactions in Iron Rods are delayed in consequence of the failure of the Treasury Department to promptly decide the rate of duty which should be levied on them. A large business will undoubtedly be done if the Department announces its decision soon, especially if the decision is in favor of $\frac{6}{10}$¢ ℔ pound. Quotations for Steel Rods are $50 ℔ ton laid down in New York, duty paid, but large buyers could shade these figures, although they are so unremunerative that many German Rod mills have stopped making them for the present. No quotations for Iron Rods can be made under the circumstances.

Steel Rails.—There are heavy orders in prospect, and it is very likely that opening prices for next year's delivery will soon be fixed. For the remainder of this year Eastern mills have nearly all they are prepared to do, and for such small lots as they are able to work in they get full prices, $39 @ $40, at mill, being obtained in this way for prompt delivery. Sales aggregating 10,000 tons have been made at $37 @ $38.50 for later delivery, but $37.50 @ $38 is about a fair quotation, based on average sales not under pressure as to time. A good demand for rails is reported from the Mississippi Valley, and Western mills are receiving orders for considerable quantities at about $40.

Old Rails.—There is considerable inquiry for Old Rails. Such lots as are held here cannot be bought under $24. A sale of 1000 tons American T's has been made at $23, delivered at a Sound port. We also hear of a sale of 200 tons D. H.'s at $25.

Wrought Scrap.—The movement is very small, and dealers, almost without exception, complain of the lack of business. There is no disposition to reduce prices, however, as the stock of Old Iron here is very small. No. 1 Selected Wrought sells at $24 @ $25, but a large order could hardly be filled at the outside price. For shipment $23.50 has been paid.

SALES ON METAL EXCHANGE.

The following sales have been reported during the week:

THURSDAY, August 30.

200 tons American Pig, No. 1, Nov.	$21.87½
200 " " " " " Jan.	22.37½
100 " " " " " "	22.37½

FRIDAY, August 31.

300 tons American Pig, No. 1, Jan.	$22.25
25 " Straits Tin, spot	21¢
10 " Australian Tin, spot	21¢

SATURDAY, September 1.

200 tons American Pig, No. 1, Jan.	$22.25

MONDAY, September 3.

200 tons American Pig, No. 1, Dec.	$22 00
100 " " " " "	22.00
50 " Straits Tin, Aug.-Sept. ship	20⅞¢

TUESDAY, September 4.

25 tons Straits Tin, Aug.-Sept. ship	20⅞¢

WEDNESDAY, September 5.

No transactions.

METALS.

Copper.—Sales for the week sum up 250,000 ℔ Lake Superior at 15⅛¢ @ 15¼¢, while other brands are worth 14¼¢ @ 14½¢, the market closing very firm at these rates. Although no large transactions have taken place in the course of last week—manufacturers still being stocked—the feeling, nevertheless, begins to predominate that we have seen the lowest price of Copper for this season, and that there is some probability of a moderate advance in the near future. The bulk of the supply from Lake Superior arrived in June, July and August, and has been absorbed by our manufacturers and exporters, while there is no stock to speak of in the hands of either dealers or speculators. Turning next to the situation in Europe, it should, in the first place, be emphasized that during the last three years the stock of Copper in Europe has decreased each year 5000 tons, and, in the next place, that a speculative movement for a rise was only restrained by the enormous increase of production here, for if Rio Tinto went on increasing likewise, Chili recovered very slowly. Hence, now that the Europeans have for the current year stood the brunt of the additional supply as well as they have done, they begin to examine into the statistical position on both sides, and find that it is better than they expected it would be but three months since, for they discover that consumption has expanded on a par with production in general, in consequence of the greater uses for Copper for electrical and other purposes. It is at the same time, so far as we are concerned, conceded that Montana Copper—representing the bulk of our increase—will find its way to England, even at an advance of a cent or two on this side, and for special purposes a European demand will continue to exist for our Lake Copper. Whichever way we look at the general position of Copper in Europe and here, it therefore seems to us well calculated to attract attention. London up to last night continued unaltered; Best Selected, £68, and Chili Bars, £64. This afternoon we are cabled from there to the following effect: "Market without change to note. Best Selected, £68. 10/, and Chili Bars £63. 15/ @ £64." Manufactures may be quoted as under: Bottoms, 24¢; Braziers, 24¢; Sheathing, 22¢, and Bolt Copper, 24¢.

Tin.—After being slightly weaker, the market for Straits has recovered to 21¢ @ 21¼¢, large lines, on the spot, Lamb and Flag being worth 21¾¢. London came last night £94. 5/, and Singapore £94. 10/, cost and freight per steam to New York. We receive the telegraphic message below, this day: "Market a little firmer. Straits Ingot, spot, £94 @ £94. 15/, and Futures, £94. 5/ @ £94. 15/." Week's shipments from the Straits, 100 tons to London, and 300 to New York. Mr. Charles Nordhaus, 13 Cedar street, New York, makes the statistical position on this coast as under:

		Tons.
August 1, stock		1 000
August arrivals		2,150
Total		3,150
Estimated August consumption		1,150
September 1, stock		2,000
Afloat from the Straits	2,470	
From Australia	300	
From London	200	2,970
September 1, visible supply		4,970

According to Messrs. Gilfillan, Wood & Co., Singapore, the shipments from the Straits to the United States during the first six months were, in piculs of 134 pounds, this year: 52,489 piculs, against last year 46,901; 34,239 in 1881; 71,740 in 1880; 48,641 in 1879, and 35,328 in 1878. Import into the United States, fiscal year 1883: 11,891 tons, worth $6,106,250, against 9331, worth $4,933,538 in 1882. *Tin Plates.*—There has been a fair jobbing demand; stocks continue light. We quote at the close, large lots, ordinary brands, ℔ box: Charcoal, Bright, $5.62½ @ $6; do. Ternes, $5.12½ @ $5.37½; Coke Tin, $5 05 @ $5.25, and do. Ternes, $4.75 @ $5. Liverpool is steady; Coke, 15/9 @ 16/, and Charcoal, 18/6 @ 20/. From London we are wired that Tin Plates are irregular. Import into the United States fiscal year 1883: 216,089 tons, worth $17,699,239 against last year, 196,844, worth $16,599,264.

Lead—Has remained quiescent; sales of larger lots do not sum up over 200 tons Common Domestic at $4.30, and Newark do. at $4.35, while in a jobbing way Common Domestic has brought $4.35. Refined is inactive at $4.35, nominally. St. Louis asks $4.05 for Hard, and $4.10 for Soft; at these figures nothing has transpired. From London we are informed that there is no change. Manufactures are quoted as follows: Lead Pipe, 6¾¢; Sheet Lead, 7½¢; Tin-lined Lead Pipe, 15¢ ℔ ℔, and Block-Tin Pipe, 45¢, less the usual discount to dealers.

Spelter and Zinc.—Common Domestic Spelter is inactive and featureless at 4½¢, and Silesian nominal at 5 @ 5⅛¢; Bertha Refined, 7¾¢, and Bergenport, 9½¢. *Sheet Zinc* is moderately active at 6¢ @ 6⅛¢. From London we are wired to-day to the following effect: "Market irregular. Ordinary, £14. 17/6 @ £15. 2/6 at shipping ports." Import of Spelter into the United States, fiscal year 1883: 7734 tons, worth $664,474, against last year 8,26, worth $739,319.

Antimony.—A steady market has prevailed in this metal, Cookson selling at 10¼¢ @ 10½¢, and Hallett at 9¼¢.

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the week ending September 4, 1883.

Bremen.

	Quan.	Val.
Ag. imp., pkgs	4	$275
Shaft	1	700
Mf. iron.pkgs.	36	1,,00
Hdw., cs	12	350

Dutch East Indies.

Ptlm, gals.	580,000	56,809

Antwerp.

Arms, cs	4	856
Sew. ma., cs	3	75
Ptm., gls.	1,388,025	116,930
Hdw., cs	10	205
Sinks, cs	3	42
Mach'y, pkge.	1	25

Arendal.

Ptlm., gals		10,872

Hamburg.

Ptlm., gals.	887,418	60,944
Sew. ma., cs.	1199	18,248
Hdw., pkgs	89	1,145
Ag imp.,pkgs	62	1,240
Mach'y. pkgs.	11	2,059
Clocks, cs	56	2,376

Rotterdam.

Copper, cks	65	16,218
Mach'y. pkgs	27	700
Scales. pkgs	26	215
Copper, bars	187	2,800
Ptlm., gals.	324,043	28,125
Clocks, cs	3	240
Hdw., pkgs	45	1,206
Mf. iron, pkgs	102	1,015

Liverpool.

Cutlery, cs	4	733
Machs., pkge.	1	50
Wire g'ds, cs	3	449
Cop.mat.,bgs	815	8,981
Copper, bars	162	7,374
Mf. iron,pkgs.	13	602
Cott. gins, cs	4	189
Ptlm., gals.	513,113	41,875
Pumps, pkgs	10	439
Clocks, cs	416	9,696
Ag.imp. pkgs	9	448
Hdw., pkgs	28	966
Rifles, cs	100	21,000
Zinc, bbls	3	30

Danzig.

Ptlm., gals.	200,036	14,750

Elsinore.

Ptlm., gals.	275,967	22,475

Copenhagen.

Clocks, pkgs	100	1,565
Mf. iron, pkge	1	25

Stettin.

Ptlm., gals.	303,597	23,948

Cronstadt.

Ptlm., gals.	169,651	15,113

Glasgow.

Ag. imp.,pkgs	25	355
Mach'y. pkgs.	6	1,760
Hdw., cs	5	241
Sew. ma., cs.	395	7,058
Tin, cs	8	105
Pumps, pkgs.	8	119
W. wheel	1	150
Mf.iron. pkgs.	2	120
Cartridges,cse	1	70
W. metal, cs.	10	400

London.

Mf. iron, pkgs	19	818
Clocks, cs	27	1,141
Sew. ma., cs.	284	5,309
Wringers, cs	29	050
Pumps, pkge.	1	21
S. rollers, cs.	7	104
Firearms, cs.	8	1,075
Cartridges, cs	14	249
Ag. imp..pkgs	10	311
Hdw., pkgs	283	7,573
Iron safes	10	805
Scales, cs	34	687
Mach'y. pkgs.	37	5,458
Ptlm., gals.	355,600	33,075

Hull.

Mach'y pkgs	7	878
Pumps, pkgs.	5	300
Hdw., pkgs	92	2,017
Clocks, pkgs	79	1,534
Ag. imp.,pkgs	3	104
S. rollers, cs	4	146

Dublin.

Ptlm., gals.	159,346	11,951

Bristol.

Clocks, pkgs	22	410
Sew. ma., cs	184	3,3?0
Cop. mat., cks	19	813

Londonderry.

Ptm., gals	150,000	15,000

New Brunswick.

Ptlm., gals	2500	275
Ir. ore, tons	110	550

British East Indies.

Ptlm., gals.	483,280	47,120

British West Indies.

Nails, kegs	117	461
Ptlm., gals.	13,230	1,369
Mf. iron, pkgs	9	65
Cutlery, cs	2	52
Hdw., pkgs	24	355
Ag.imp., pkgs	6	38

British Australia.

Hdw., pkgs	1259	24,470
Mach'y. pkgs	60	5,609
Mf. iron.pkgs.	55	1,251
Tacks, cs	19	779
Pumps, pkgs.	65	4,021
S rollers, cs	7	234
Scales, cs	18	403
Cutlery, case	1	50
Saws, cs	32	2,380
Axles bxs	6	231
W. wheel	1	375
Sew ma., cs	213	5,160
Ag.imp..pgs	76	1,661
Ptlm., gals.	67,500	8,472
Nails, cs	5	68
Clocks, cs	218	4,297
Wringers, cs.	20	393
H. nails, bxs.	51	171
Nails, kegs	137	590

Hong Kong.

Locks, cs	3	155

Dunkirk.

Ptlm., gals.	441,425	31,903

Canada.

	Quan.	Val.
Mach'y. pkgs.	4	$487
Tin plate.bxs.	8	40

Newfoundland.

Clocks, pkgs	10	125
Mf. iron, pkgs.	13	211
Mach'y, pkgs.	9	700
Sew. ma, cs	2	45
Saws, case	1	30
W. goods, cs	2	74
Hdw., case	1	27

British Guiana.

Hdw., cs	26	225
Scales, cs	4	47

Havre.

Furnaces, cs.	2	300
Copper, cks	45	9,000
Clock	1	300
Mf. iron, pkgs	41	450
Ag. imp., pkgs	5	600
Mach'y. pkgs.	21	8,535
Sew. ma., cs	7	450

Bordeaux.

Copper, cks	180	33,750
W. mills, pkgs	4	125

Nova Scotia.

Ptlm, gals	57,150	5,870
Tin, pigs	20	250
Stpdware, cs	2	41
Sew. ma., cs	13	300
Iron bars	75	776
Hdw., pkgs	23	734
Mf. iron, pkgs	9	379
Pumps, pkgs	3	46

Cuba.

Mach'y, pkgs.	671	22,872
Scales, cs.	7	213
F.engines, bxs	4	179
Boilers	8	10,922
Nails, kegs	50	187
Brass g'ds, cs.	3	411
Cutlery, cs	3	232
Nails, csk	1	30
I. wheels	100	425
Saws, case	1	35
Scale	1	233
Pumps, pkge.	1	52
Tin oil, case	1	142
Hdw., pkgs	106	985
Mf. iron,pkgs.	1209	18,420
Chains	2	234
Met. bottles	8	169
Ptlm. gals	15,650	790
Tin, cs	4	180
Sew. ma., cs	167	4,994
W. goods, cse	1	50
Ag. imp.,pkgs	78	2,447
Shears, case	1	75
Clocks, cs	2	43
Nails, bxs	10	40
Tacks, kegs	6	79

Spanish Possessions in Africa.

Ptlm., gals	5,000	480

Barcelona.

Ptlm., gals.	123,764	10,303
Mf. iron, pkgs	73	541
Tinfoil, case	1	23
Screw caps, pkgs	3	63
Nails, kegs	20	82

Bilbao.

Ptlm., gals.	157,640	14,184

Porto Rico.

Ptm., gals.	14,650	1,584
Mf. iron. pkgs	67	727
Cutlery, cs	3	73
Mach'y. pkgs.	126	4,313
Ag.imp.,pkgs.	6	183
Iron, pkgs	91	300
Iron safes	4	1,350
Nails, kegs	30	127
Iron rails	442	1,053
Sew. ma., cs	11	350
Hdw., pkgs	18	358
Scales, cs	12	280

French West Indies.

Ptlm., gals	2000	180

Brazil.

Hdw., pkgs	310	5,316
Ag imp.,pkgs	26	450
Cott. gins, cs	11	485
Tacks, cs	34	180
Car wheels,pr	4	75
Shoe nails,bxs	16	98
Cutlery, cs	31	677
Nails, kegs	100	275
Ptlm., gals.	133,894	12,8?8
Mf. iron, pkgs	3	30
Sew. ma., cs	57	894
Scales, cs	9	135
Nails, cs	8	40

Venezuela.

Mach'y. pkge.	1	650
Iron, bdls	37	300
Ptm., gals	6000	685
Cutlery, case.	1	33
Mf. iron. pkgs	7	300
Nails, kegs	3	12

Mexico.

Mach'y. pkgs.	307	15,302
Sew. ma., cs	245	4,863
Tacks, cs	3	61
Cutlery, cs	42	1,337
P. caps, cs	3	225
Revolvers, cs.	2	225
W. closets	20	107
Pumps, pkgs.	4	278
Ag. imp, pkgs	70	1,011
Solder, case	1	71
Ptlm., gals.	42,250	4,295
Nails, kegs	72	251
Mf. iron, pkgs	416	3,554
Hdw. pkgs	76	1,896
Cartridges, cs	5	78
Clocks, cs	3	60
Nails, pkgs	12	223
W. gds., pkgs	6	152
F. arms, cs	2	705
Copper, case.	1	100
Tinfoil, cs	2	70

Hayti.

Hdw., cs	11	169
Zinc, cs	2	60
Ptlm. gals	5000	470
Mf. iron, pkgs.	4	56
Sew ma., cs	17	167

Uruguay.

Mf. iron, pkgs	4	12
Cartridges, cs	12	17
Ag. imp.,pkgs	165	1,98?

	Quan.	Val.
Ptlm., gals.	62,000	$5,750
Hdw., cs.	2	165
Clocks, pkgs.	95	1,600
Rifles, cs.	3	508
Sew. ma., cs.	25	381
Oporto.		
Ptlm., gals.	48,400	11,000
Mf. iron, pkgs	48	431
Naples.		
Ag. imp., pkgs	3	38
Santo Domingo.		
Ptlm., gals.	5000	557
Mf. iron, pkgs.	269	3,201
Mach'y, pkgs.	410	18,477
Sew. ma., cs.	4	107
Cartridges, cs.	80	1,590
Scale	1	157
Fish plates, bdls	250	160
Pumps, pkgs.	2	35
Iron, pkgs.	53	138
Ag. imp. pkgs	5	61
Hdw., pkgs.	22	484
Nails, pkgs.	8	33
Nails, kegs	26	83
Steel rails	1765	4,584
Spikes, kegs	81	363
W. mill	1	308
Alexandria.		
Ptlm., gals.	136,000	12,300
United States of Columbia.		
Mf. iron, pkgs.	153	1,674
Ptlm., gals.	3980	537
Carbines, cs.	30	4,920
Cartridges, cs.	7	176
Scales, cs.	10	330
Iron, pkgs.	132	1,500
Fountain	1	$25
Saws, cs.	2	465
Iron safe	1	50
Hdw., pkgs.	35	1,017
Cutlery, cs.	11	617
Sew. mach. cs	187	4,520
Mach'y, pkgs	88	4,544
Ag. imp., pkgs	12	712
Clocks, cs	11	213
Nails, kegs	84	259
Revolvers, cs	5	652
Pumps, pkgs.	2	57
Guns, case	1	75
Smyrna.		
Ptlm, gals.	362,690	31,471
Constantinople.		
Ptlm., gals.	166,350	14,967
Argentine Republic.		
Sew. ma., cs.	317	5,889
Mf. iron, pkgs	475	2,320
Shoe nails, bxs	80	690
Hdw., pkgs	206	5,560
Wash. ma., cs	12	130
Scales, cs.	24	755
Iron safe	1	200
Mach'y, pkgs.	25	1,914
Ag. imp., pkgs	163	4,400
Ptlm., gals	53,000	5,400
Clocks, pkgs	53	2,840
Pumps, pkgs.	196	470
Central America.		
Mach'y, pkgs.	13	226
Sew. ma., cs.	1	15
Hdw., pkgs.	2	42
Sandwich Islands.		
Locks, cs.	4	100
Mach'y, pkgs.	5	275

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending Sept. 5, 1883.

Hardware.

Baldwin Bros. & Co.
Packages, 22
Boker Hermann & Co.
Cutlery and guns, pkgs., 63
Borgfeldt Geo. & Co.
Ironware, case, 1
Bureau of Ordnance,
Gun barrels, 19
Projectiles, 15
Burdett & Pond,
Mach'y, case, 1
Curley Bros.
Mdse., cs., 3
Des Marets & Co.
Mach'y piece, 1
Downing, Sheldon & Co.
Arms, cs., 14
Drexel, Morgan & Co.
Arms, cs., 33
Duden & Co.
Mach'y, case, 1
Dunham, Buckley & Co.
Packages, 19
Field Alfred & Co.
Guns, cs., 14
Mdse., cs, 49
Folsom H. & D.
Arms, cs., 9
Mdse., cs., 12
Foulke & Co.
Saws, case, 1
Franke Henry,
Mach'y, pkgs., 4
Godfrey C. H.
Arms., cs., 4
Gt. Western Disp. Co.
Arms, cs., 11
Greenmont Spinning Co.
Mdse., cs., 5
Graef Cutlery Co.
Cutlery, cs., 7
Hildick A. H.
Anvils, 101
Vises, 18
Cask, 1
Johns H. W. Mfg. Co.
Nails, kegs, 100
Maltby, Curley & Co.
Arms, case, 1
Markt & Co.
Cases, 16
Merch. Disp. Co.
Ironware, cs., 3
Ironware, crates, 2
Ironware, pcs., 6
Arms, cs., 22
Cases, 6
Mach'y, cs., 11
Middleton & Co.
Box irons, 1
Moore's Sons J. P.
Cases, 7
Morrell & Co.
Cases, 2
Penny Capt.
Cases, 15
Read, Holiday & Sons,
Mach'y, cs., 7
Schoverling, Daly & Gales,
Arms, cs., 27
Seixas & Pardo,
Mach'y, pcs., 2
Squires, H. C.
Mdse., cs., 2
Stevens, Voisin & Co.
Cases, 3
Stevenson J. E.
Mach'y, case, 1
Strassburger Oscar & Co.
Cases, 76
Tryon E. K.
Guns, cs., 14
The Clark Mile End Cotton Co.
Mach'y, pkgs, 36
Vom Cleff & Co.
Mdse., case, 1
Wiebusch, Hilger & Co.
Hdw. and cutlery, pkgs., 60
Anvils, 330
Ward Asline,
Mdse., cs., 6
Order,
Staples, kegs, 2
Rivets, cs., 49
Cases, 4
Files, cks., 9

Iron.

Baring Bros. & Co.
Wire rods, coils, 0914
Rivet rods, coils, 506
Coddington T. B. & Co.
Sheets, bxs., 103
Sheets, bdls., 566
Crocker Bros.
Pig, tons, 500
Dickerson, Van Duzen & Co.
Sheets, bdls., 601
Elliott, Sons & Co.
Ore, kg., 350,000
Lalance & Grosjean Mfg. Co.
Sheets, bdls., 275
Ledgerwood W. V.
Boilers, 13
Lundberg Gust.
Bars, 9652
Mason J. W. & Co.
Wire rope, coils, 11
McComb J. J.
Cotton ties, bdls., 2200
McDowell & Hernley,
Iron tubes, 6
Meyer G. A. & E.
Oxide, bbls., 22
Morris L. W.
Ironwork, cask, 1
Naylor & Co.
Spiegeleisen, cks., 380
Pim, Forwood & Co.
Pipes, pkgs. and pcs., 42
Stetson Geo. W.
Pig, tons, 200
Stevenson, Pierson & Co.
Pig, tons, 14
Williamson Jas. & Co.
Pig, tons, 600
Woltmann & Mickerts,
Wire rods, bdls., 3
Wood, Niebuhr & Co.
Wire rods, pkgs., 521
Order,
Pig, tons, 3010
Pig, lot
Ore, tons, 1215
Sheet, bxs., 7
Sheet, bdls., 1312
Mang. ore, bbls., 14
Fencing wire, coils, 100
Wire rods, bdls., 6252
Spiegel, casks, 563
Spiegel, tons, 750
Rods, bdls, 11,646
Bars, 7669
Wrought iron, cs., 12
Coiled rods, bales, 850
Black plates, bxs., 185
Sheets, 451
Angle iron, bars, 153
Scrap, tons, 200

Steel.

Baring Bros. & Co.
Rods, bdls., 4103
Cary & Moen,
Wire ropes, coils, 110
Downing, Sheldon & Co.
Bundles, 24
Harrison, Oxley & Co.
Packages, 23
Plock & Co.
Tires, 137
Seligman J. & W. & Co.
Rails, 800
Temple & Lockwood,
Cases, 17
Bundles, 131
Bars, 54
Order,
Rails, 3030
Bar ends, bxs., 475
Casks, 19
Bands, 109
Rods, cks., 3
Bundles, 280

Metals.

Brown Bros. & Co.
Plumbago, bbls., 264
Cort N. L. & Co.
Tin plates bxs., 7995
Dickerson, Van Duzen & Co.
Tin plates, bxs., 4155
Field Alfred & Co.
Gun caps, cs., 13
Meyer G. A. & E.
Zinc oxide, cks., 200
Mieder C. W. & Co
Old copper, bbls., 8
Phelps, Dodge & Co.
Tin plates, bxs., 8040
Tiemann T. & Co
Zinc oxide, bbls., 50
Order,
Tin plates, bxs., 19,042
Tin plates, cs., 4
Tin, slabs, 15.8
Tin ingots, 731
Plumbago, bbls., 871
Billiton tin, slabs, 300
Banca tin, slabs, 200

COAL.

Now that the September circulars are out in the Anthracite Coal trade, announcing an advance of from 10 to 25¢ ℔ ton on nearly all sizes, little remains to be said. The Lehigh and Schuylkill Coal Exchanges alone are recalcitrant. For special Coals the advanced prices may have been realized in some instances, but, as a rule, sales are not up even to the August circulars. For outside Coals the current prices obtained are far behind, and there are not a few who ridicule the idea of an attempted advance as matters stand. Trade is spoken of as in good shape generally, with an improved demand for the domestic sizes. In Hard Coals there has been some delay at shipping points. The Western Association have advanced the prices of Anthracite 10¢ ℔ ton on Egg, and 15¢ on Stove and Chestnut, at all points, either by rail or vessel. The Pottsville *Miner's Journal* says: "The trade continues in a very animated condition. All the Coal mined is placed as rapidly as it can be transported, and buyers are filling orders for future delivery in considerable quantity. The outlook is very favorable for the largest and best business this year of any since the beginning of Anthracite mining."

The Bituminous trade of late is a shade better, and Cumberland is quoted about $4.25. The total amount of Anthracite Coal sent to market for the week ending August 25 was 720,042 tons, compared with 621,508 tons in the corresponding week last year, an increase of 98,534 tons. The total amount of Anthracite mined thus far in the year 1883 is 19,024,098 tons, compared with 17,639,175 tons for the same period last year, an increase of 1,384,923 tons.

OLD METALS, PAPER STOCK, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy	℔ lb.	$0.10½	@ .....
" light	"	.10	@ .....
Copper Bottoms	"	.10	@ .....
Yellow Metal	"	.07½	@ .....
Brass, heavy	"	.08	@ .....
" light	"	.07	@ .....
Composition, heavy	"	.10½	@ .11
Lead heavy	"	.03¾	@ .....
Tea Lead	"	.03¾	@ .....
Zinc	"	.02½	@ .....
Pewter, No. 1	"	.12	@ .....
" No. 2	"	.08	@ .....
Wrought Iron	℔ ton.	22.50	@ .....
Light "	"	12.00	@ 13.00
Stove Plate	"	11.50	@ 12.00
Machinery "	"	14.50	@ 15.00
Grate Bars	"	4.50	@ .....
Stereotype Plates	℔ lb.	.04½	@ .05
Electrotype "	"	.04¼	@ .04½
Small Type	"	.05	@ .05½

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen	℔ lb.	3½c.	@ 4 c.
White Cot. on. New	"	3½c.	@ .....
" No. 2	"	2½c.	@ 2¼c.
White, No. 1	"	3¾c.	@ 4 c.
" No. 2	"	1¾c.	@ 2 c.
Seconds	"	½c.	@ 1 c
Soft Woolens	"	5 c.	@ 6 c
Mixed Rags	"	1½c.	@ 1¾c.
Gunny Bagging	"	1½c.	@ .....
Jute Butts	"	1¼c.	@ .....
Kentucky Bagging	"	.....	@ 3¼c.
Book Stock	"	1¾c.	@ 2 c.
Newspapers	"	1 c.	@ .....
Waste Paper and Scraps	"	½c.	@ .....
Kentucky Bale Rope	"	3½c.	@ 4

FOREIGN TRADE MOVEMENTS.

Included in the imports for the week ending September 1 were leading articles of merchandise valued as follows:

	Pkges.	Value.
Antimony	50	2,712
Anvils	665	7,567
Brass goods	25	2,900
Bronzes	28	2,894
Chains and anchors	31	2,147
Clocks	63	6,281
Copper	...	1,109
Cutlery	348	37,153
Gas fixtures	1	628
Guns	68	10,012
Hardware	3	115
Iron, pig, tons	5,371	96,979
Iron, sheet, tons	81	5,030
Iron ore, tons	1861	1,845
Iron cotton ties	2,200	1,662
Iron, other, tons	2,136	82,958
Machinery	91	9,030
Metal goods	233	21,953
Needles	14	6,849
Nickel	4	3,751
Old Metal	..	994
Platina	3	2,813
Pins	63	2,188
Saddlery	10	1,232
Steel	8,642	29,733
Spelter	110,344	4,335
Silver ore	4	50
Tin, bxs	18,921	89,248
Tin, slabs, 14,033; lbs., 1,217,8 9	....	258,898
Wire	364	3,570
Zinc oxide	350	3,849

The importation of cutlery and hardware compares with previous dates as follows:

	For the week.	35 weeks of 1883.	Same time 1882.
Cutlery, pkgs	348	5,470	5,070
Hardware, pkgs	3	827	751
Iron, R. R., bars	....	10,642	83,240
Lead, pigs	.....	6,324	20,702
Steel, pkgs	8,642	2,281,608	1,301,572
Tin, bxs	18,921	1,361,010	1,552,674
Tin slabs, ℔	1,217,6 9	15,063,873	11,952,435

PHILADELPHIA.

Office of *The Iron Age*, 230 South Fourth St., PHILADELPHIA, Sept. 4, 1883.

Pig Iron.—The market has shown but little change during the week, but there seems to be a better feeling, and prices are held with a fair degree of firmness. There is not much disposition to place orders in advance of requirements, but consumption seems to absorb the output from week to week, so that there are no indications that stocks are increasing. On the contrary, the offerings are somewhat limited, but, in the meantime, quite sufficient to prevent any change in quotations. It is difficult to say what the outcome will be, but, for the time being, there is more confidence in values, and very few seem to expect lower prices. The past week has developed a better feeling throughout the entire trade, and while it is difficult to point to any department showing a special increase of business, the tone of the market is undoubtedly better than it has been for some weeks past. In fact, the conviction is becoming general that business is in a healthy condition, and that the shrinkage of the past six months is about exhausted. The decrease in consumption has probably been fully discounted, and although the volume of business may for a while be 8 or 10 per cent. below the extraordinary years of 1880, 1881 and 1882, it is no reason why prices should be forced below the cost of production. Then, again, as regards Pig Iron, the output has already been so largely reduced that the supply may after a while prove inadequate for the current requirements of the trade. It is believed that every furnace in the country that can make Iron at to-day's prices is already in operation, so that if the supply should prove to be insufficient, nothing but a higher range of prices is likely to increase it. In the meantime, buyers and sellers alike are groping their way along until the position is more clearly defined, the tendency, as we have already shown, being to take a more hopeful view of affairs. Sales have been chiefly in small lots, deliveries on former contracts absorbing the major portion of the output. No. 1 Foundry has sold at prices varying from $22 to $23.25, delivered, according to quantity, brand, &c., market closing very steady. No. 2 Foundry is comparatively dull, but at $19.50 @ $21, delivered, there is a fair demand, and apparently some little decrease in the supply, which for a while was unusually heavy. Mill Irons about hold their own, but have not sold as freely as the other grades. Consumers have hard work to find a market for their products at remunerative prices; hence the necessity for cheaper material. Sellers are very much in the same position, however, and are equally unwilling to make concessions, so that the market has rather an unsatisfactory appearance, although it cannot be called lower. About $17.50 @ $18 at furnace seems to be the ruling price for standard grades, up to $19 for one or two choice brands. Low-grade Irons have been in active demand, and at $16 @ $16.50 it is probable that a good many thousand tons would be taken, but the market has been pretty well cleared of Mottled and low-priced Gray Irons.

Foreign Iron.—Bessemer is neglected, and there appears to be no attempt to do business by either buyers or sellers. Spiegeleisen is in demand by large consumers, but prices named are very low. A lot of 1000 tons, 20 %, was sold for shipment to New York, at little, if anything, over $30.50. Buyers offer $30 for large lots.

Muck Bars.—Market steady and fairly active, with sales chiefly on the basis of $34 at mill, although higher prices are asked by some holders.

Blooms—Quiet and unchanged; sales in small lots at former quotations as follows: Charcoal Blooms, $57 @ $58; Run-out Anthracite, $47.50 @ $49; Scrap Blooms, $42 @ $44; Northern Ore Blooms, $39.50 @ $41.50.

Bar Iron.—The market is in much the same condition as noticed in recent reports. The mills seem to be pretty well employed, but the orders are for small lots, and of a class that cannot be handled with much profit to manufacturers. Prices are maintained at from 2.15¢ to 2.25¢ for such lots as are called for, but it would be impossible to secure large orders at these figures. It may be stated, however, that there is very little inquiry for large lots; neither are manufacturers crowding the market, but are satisfied with such business as comes along at current rates. It is difficult to say what the outcome will be for the fall trade, although the chances seem to be in favor of a steady market at about to-day's prices. Capacity for production is too large to admit of much advance in prices, and quotations are already too near cost of production to permit much decline. There is more inquiry for Skelp Iron, and several hundred tons are likely to be taken at about 2.15¢, delivered.

Plate and Tank Iron.—The demand for Plate Iron continues satisfactory, and prices are steady at last week's quotations. No new orders of importance have been entered during the week, leading consumers taking deliveries on contracts made some time ago. A 400-ton lot of Common Plate was taken by the Cambria Iron Company, price said to be 2.35¢, delivered at Johnstown, Pa. Boat and Bridge Plate are held at 2.4¢ @ 2.5, but the mills are so full of work that they are not anxious for business, unless for deliveries after next month. Last week's quotations may be repeated, as follows: Tank Iron, 2.5¢; Boat Plate, 2.35¢ @ 2.4¢; Shell, 3¢ @ 3.25¢; Flange, 4¢ @ 4.25¢, and Fire-Box, 5¢ @ 5.5¢.

Structural Iron.—The general position is unchanged; new business somewhat slow, but deliveries on old contracts called for with a good deal of urgency. The mills are full of work for the next two months, besides which there is a good deal of business likely to be placed before the close of the year, so that, on the whole, the outlook is not discouraging. Prices are as follows: Angles, 2.3¢ @ 2.4¢; Tees, 2.8¢ @ 3¢; Beams and Channels, 3.5¢.

Sheet Iron.—There has been an active demand for the high numbers, and manufacturers have all they can do to fill their orders promptly. Plates are comparatively dull, and prices a trifle easier. For small orders quotations are about as follows:

Common Sheets, No. 28	4½¢
Common Sheets, Nos. 26 and 27	4¼¢
Common Sheets, Nos. 21 to 25	4 ¢
Common Sheets, Nos 18 to 20	3¾¢
Best Refined, ¼ % advance on the above.	
Best Bloom Sheets, Nos. 26 to 28	6½¢
Best Bloom Sheets, Nos. 22 to 25	6¼¢
Best Bloom Sheets, Nos. 16 to 21	6 ¢
Common Red Plates, 3-16 to 16	2.7¢
Best Bloom, Galvanized, discount	40 %
Second quality, discount	50 %

Wrought-Iron Pipe.—The demand is fair, but the tone of the market is weak and irregular. Competition is very sharp, and the market is strongly in buyers' favor; consequently, it is somewhat difficult to quote with any degree of exactness. We continue last week's quotations, viz.: 60 % off list price on Boiler Tubes, and 70 and 5 % off on Gas and Steam Pipe.

Steel Rails.—Business is still confined to early deliveries, buyers being unwilling to place orders at the figures generally asked. Direct orders for large lots are difficult to obtain at any price, although it is understood that $36 @ $36.50 would be paid for lots of 5000 to 10,000 tons each. Manufacturers quote $37.50 @ $38 for winter deliveries, and would probably meet good buyers half way, providing it would likely lead to business, but for the present both sides seem to be waiting developments. Sales for delivery during October and November are being made at $38 @ $38.50. Market quiet and steady.

Old Rails.—Buyers are in the market for Old T-Rails at about $23 @ $23.50, but there are no spot lots, so that quotations are entirely nominal. Lots for shipment are offered at $23.50 @ $24, but these figures are considered too high.

Old Car Wheels.—Sales, 400 tons Baltimore at $17.

Scrap Iron.—There is a slightly improved demand, and, while prices are not higher, holders manifest more confidence in values. Cargo lots of No. 1 command $23 @ $23.50, and selected lots from yard $24.50 @ $25, with sales of several good-sized lots at outside figures.

Nails.—Stocks continue comparatively light, although the demand is not quite as urgent as it was a few weeks ago. The market, however, may be reported steady and firm at $3 ℔ keg in an ordinary way, with slight concessions on large lots.

PITTSBURGH.

Office of *The Iron Age*, 77 Fourth Avenue, PITTSBURGH, PA., Sept. 4, 1883.

While there has been no perceptible change in the general position of the Iron trade during the past week, a better and more cheerful feeling obtains, and the indications now are that there will be an improvement within the next week or two, as the time for the fall trade is near at hand. The reports from the West and South, as a rule, are favorable; in some sections the crops are light, but generally there will be an average yield, and our manufacturers look for a good demand for manufactured goods from now until the close of the year. Stocks of nearly all descriptions of manufactured goods in the hands of jobbers and large consumers are reported as being comparatively light. There is nothing in the outlook to warrant any very marked advance; hence people are ordering goods simply as they need them. There is every reason to believe that for Iron, Steel, Nails, &c., prices have reached the lowest point. Ordinary Merchant Iron is now being sold at about the cost of production, the raw article is no better, and, as the cost of production is claimed to be as low as it can go, it is easy to see that the prices of the products cannot be pushed much below where they are.

There have been no financial complications here for some time, and those that have occurred have been placed in such a condition that it is hoped that they will be able, with the time granted, to pay their creditors in full. Mr. Staunton, of New York, who was appointed receiver of the Manchester Furnace Company, states that it is the intention to run the furnaces until the supply of Ore contracted for has been absorbed, when the product will be sold and a general wind-up effected.

Pig Iron.—The lull noted in our report of a week ago continues; the volume of business during the period under review has been exceedingly small, but an increased trade is looked for before the close of the present month. The tone of the market, as might be expected in view of the decreased demand, has weakened, but producers are confident of a reaction in the near future, and there is good reason to believe that their expectations will be realized. As the puddling furnaces are nearly all in operation, many of them working double turn, the consumption is large and increasing, and as but few consumers have large stocks it will be necessary to replenish before long; it is probable, therefore, that some of them will be feeling the market before the close of the present week, with a view to buying. Our home furnaces are sold from one to two months ahead, and are not anxious to make additional sales at current prices. We repeat former quotations:

No 1 Foundry	$21.00 @ $21.00,	4 mos.
No. 2 "	19.00 @ 20.00,	4 "
Neutral Grey Forge	17.50 @ 18.00,	4 "
All-Ore Forge	19.00 @ 20.00,	4 "
Warm-Blast Charcoal	25.00 @ 27.00,	4 "
Cold " "	27.00 @ 31.00,	4 "
Bessemer Iron	21.00 @ 21.50,	4 "

Large blocks of Bessemer Iron may be fairly quoted at $20.50, cash, and $21, 4 mos., at which rates the last large sales were made. While some furnaces are refusing to sell Mill Iron under $18.50, 4 mos., there is no trouble in buying other Irons just as good at $18, 4 mos. Foundry Irons have been exceedingly dull all summer, but an increased demand is looked for shortly.

Muck Bar.—In the absence of sales, we continue to quote at $33.50 @ $33.75, cash, at mill, at which the last sales reported were effected. Some of our mills have made contracts with others to furnish the Pig Iron and pay so much ℔ ton for puddling.

Manufactured Iron.—There has been a slightly improved demand during the past week, and while orders are mostly small, they are coming forward more freely. Those mills making a specialty of Structural and Bridge Iron are quite busy, and orders for Merchant Iron generally are more numerous. Merchant Bars generally are at 1.9¢ rates, but we hear of some very desirable orders having been placed as low as 1.85¢ and even 1.8¢. Sheet is quoted on a basis of 3.55¢ @ 3.6¢ for No. 24, and Plate at 2.5¢ @ 2.6¢. Shelp Iron, 1.9¢ @ 2¢.

Nails.—Prices are still quoted at $3, 60 days, 2 % off for cash, with usual abatement of 10¢ ℔ keg on carload lots and upward. Large jobbers, as stated in our report of last week, are buying only as their immediate necessities require, being impressed with the belief that present prices cannot be much longer maintained, claiming, as they do, that Nails are much higher relatively than Finished Iron.

Wrought-Iron Pipe.—There is a fair and increasing demand, but no improvement in prices, which to manufacturers are very unsatisfactory. Discounts are still quoted at 70 and 10 % on small, and 75 % on large sizes; on Boiler Tubes, 57½ % @ 60 %; Oil-Well Casing remains unchanged at 43¢ @ 45¢ ℔ foot, net; do. Tubing, 14¢ @ 15¢.

Old Rails.—There is no abatement in the demand, and prices are still tending upward; several sales of American Tees reported during the week at $24, with this price bid for more. Some of the brokers intimate that they might be able to obtain $24.50 for straight lots for near-by delivery. The number of buyers has increased materially within the past few weeks, while the offerings appear to be on the decline.

Steel Rails.—Heavy Sections are still quoted at $38.50 @ $39 for near-by, and $37 @ $37.50 for November or December delivery. Mills are pretty well sold for this month and next, but are open for engagement for the last two months of the year.

Railway Track Supplies.—There is a fair business at unchanged prices: Spikes, 2.6¢, 30 days; Splice Bars, 1.9¢ @ 2¢; Track Bolts, 3¢ @ 3¼¢.

Crop Ends.—There is no demand here; consumers are pretty well stocked, and brokers who have made a pretty thorough canvass report that for the present there are no buyers.

Steel Billets.—Bessemer Billets are quoted at from $40 to $43 ℔ ton, according to carbon.

Scrap.—There has been some business the past week, but prices are so irregular that it is difficult to give accurate quotations. No. 1 Wrought, $21 @ $22, net ton, for Ordinary, and $23 @ $24 for Selected; Wrought Turnings, $17 @ $18; Car Axles, $32 @ $33; Old Car Wheels, $20 @ $21, gross; Cast Borings, $13 @ 14.

Window Glass.—Prices remain unchanged; discounts on carload lots, 60 and 20 % on single and 70 and 10 % on double strength. The factories have not yet been started up, and are not likely to be until the wage-question has been disposed of. Both sides appear determined, and there is no telling when the end will come.

Coke.—Operators continue to report a very fair and increasing demand, shipments out of the producing region ranging from 55,000 to 60,000 tons ℔ week, and while as yet prices are no better, it is hoped that they soon will be. As stated in our last report, steps are being taken with a view to forming an association which, it is believed, would be of inestimable value to the trade.

White Lead.—Manufacturers report a fair business, which, it is expected, will be increased considerably within the next week or two.

CHICAGO.

Office of *The Iron Age*, 26 and 28 Clark St., Cor. Lake St., CHICAGO, Sept. 3, 1883.

Hardware.—An increased activity has prevailed in this market since our last report. Buyers are more numerous, and the predictions of a brisk fall trade are already being partly realized. Much of the demand depends upon the success of the grain crops of the country, and as later reports are more favorable, there seems to be a general feeling among the trade that before the close of the present month many buyers will come into the market to stock up who have been wanting in confidence heretofore, and getting along with small stocks and frequent purchases. There are no changes in prices to note.

Nails.—The Nail market has been considerably disturbed during the past few weeks, and an unsteady feeling exists among dealers. In the face of a demand said to be equal to the production, if not greater, Nails have declined to $3 ℔ keg for carload lots, with offers of concessions under that figure to effect sales. Smaller orders command from $3 to $3.10. Stocks are reported as being light, and it is believed by many that a reaction will speedily turn the tide in favor of higher prices.

American Pig.—There continues to be a fair demand, though a slight falling off has been noticeable during the past week. Some consumers have been supplied, while others are holding off and contending for lower prices, which creates a lull. This has had a tendency to depress the tone of the market, and to-day finds it weak and feverish. The prevailing sense of the trade, however, inclines to the opinion that the depression is only temporary, and that a higher and firmer market would be the result of only an ordinary revival in consumption. Lake Superior Charcoal, Nos. 1 and 2, has declined to $23.50, and No. 3 to $24.50; Nos. 4, 5 and 6 are reported scarce at $26. We quote other brands without change, though it is possible that concessions could be had for desirable orders. Briar Hill, $24; Himrod, $22.50; Crane, No. 1, $25; No. 2, $24; Thomas, $23 @ $26.50; American Scotch, $22 @ $25; Du Val, No. 1, $23.50; No. 2, $22.50; Fulton Notch, No. 1, $22.50; No. 2, $21.50; Calumet (nominally), $22 @ $23; Southern Coke, No. 1, $23; No. 2, $21.50; Low Moor, No. 1, $24; No. 2, $22.75, 4 mos.; Silvery Soft $21 @ $23.50; Ashland (Hanging Rock Softener), No. 1, $23; No. 2, $22, 4 mos.

Scotch Pig.—A moderate business has been doing in Scotch Pig, principally in small lots. Sales amounting to about 2500 tons have been made during the past few weeks, on terms which we did not learn.

Bar Iron.—The market for Bar Iron is fairly active when compared with other branches of the trade. Consumers, however, show no disposition to stock up, and are confining themselves to what is needed for immediate use. Refined Iron is quoted at from $2.10 to $2.20 from store. This price is liable to be shaded on orders particularly desirable.

Structural Iron.—Builders' Iron is reported in less demand during the past week than for some time previous. Much of the earlier movement was for contracts for buildings which are now in an advanced stage of completion, and a period of quietness seems to be the result. Prices remain firm, and an improvement is looked for. We quote Angle at $2.90; Beams at $3.60, and Channels at $3.80, with concessions for desirable orders.

Scrap Iron.—The market is inclined to quietness, though there have been numerous inquiries and some sales effected recently of considerable importance. Purchasers quote the following prices: No. 1 Wrought Scrap, ℔ net ton, $17; No. 1 Cast Scrap, ℔ ton, $5; No. 1 Stove Plate Scrap, ℔ ton, $10; Machine Shop Wrought Turnings, ℔ ton, $9; Cast Iron Borings, $7; Old Plows and Plow Steel, $10; Malleable Scrap, $6.

EVERETT & POST, 156 Lake street, Chicago, report to us as follows, under date of September 1, 1883: *Pig Lead.*—The Lead market has shown considerable improvement during the past week, consequent upon short supply of spot Lead. Some 600 tons Common and Refined has changed hands at $4.05 and $4.07½. The market closes quiet, but very strong—$4.07 and $4.10 bid. *Connellsville Foundry Coke*—Remains about the same as last week; is in good demand and has an upward tendency. Prime Foundry Coke is selling at $5.15 f.o.b., and Crushed Coke, $6 f.o.b. Chicago.

CLEVELAND.

RHODES & Co., Cleveland, have issued the following circular:

CLEVELAND, OHIO, Sept. 3, 1883.

Dull, stale and unprofitable are fit terms for a description of the Iron trade during the past summer months. A spurt at the East and the beginning of a spurt at the West are all that relieve the dull, grinding monotony of low prices, close figuring and bad debts. While at times it may have seemed that the skies were growing brighter, yet, after a little

sunshine, clouds and gloom have settled down again. Since the 1st of August we think we can see an improvement, slight though it may be, in the demand for Pig Metal; but as to whether the improvement will be permanent and do to base future operations on, we confess ourselves wholly unable to give a satisfactory positive opinion.

Inclining, as we do, to the optimistic view, we should dwell on the fairly good returns we have had and may expect to have from our agricultural operations. While our wheat crop will undeniably be 75,000,000 bushels short of last year, so large a surplus has been carried over from last year's crop, both here and in Europe, that we actually hear more anxiety expressed as to whether we shall have a foreign demand for our surplus wheat than any bewailing because we shall have less to export than we had from last year's crop. If, however, we read the indications aright, no one need worry but that we shall have a foreign demand for our breadstuffs at fairly good prices. The crop in Great Britain will be less than an average; it is largely short in France and in Southern Russia. In only one country has there been what can be called a first-rate crops, viz., India, which has a surplus of about 60,000,000 bushels for export. If prices here are not unduly advanced, we shall easily dispose of our surplus. The demand may come late, but come it will before the close of the crop year. Our hay and oat crop were immense and satisfactory. We are sure to have a moderately good corn crop, and if frosts keep off unusually late, it is within the range of probabilities that we may raise more corn than ever before. The cotton crop hardly promises as well, but good weather for the next month will do much for it. Altogether, while the crop prospects and realizations are not as brilliant as last year, Mother Earth and the weather have done their share toward helping us out of our slough of despond.

While our present troubles may be to some extent imaginary, and attributable, as the old story runs, to a lack of confidence, the cessation of the railroad building has had much to do with producing the want of confidence. And, indeed, with the present outlook in railroad circles, it requires a great deal of nerve to build railroads. People will build them with Rails at $60 ₱ ton, but don't want them with Rails at $38 ₱ ton. For some unaccountable reason, bonds on $60 Rails sell better than on $38 Rails. In Wall street, where railroad schemes originate, distrust and gloomy forebodings prevail to an alarming degree, and, while the general business public has little direct interest in the contests of Wall street, it remains true that the dealings on the Stock Exchange are, to some extent, an index of the country's financial and commercial condition.

Following in the line of exaggerated Wall street rumors, there is a tendency in legitimate trade circles, in such times as these, to indulge in a great deal of trade gossip in regard to the financial standing of parties suspected to be in trouble, and, as in polite society scandal sometimes questions the virtue of the purest, so do these business gossips insinuate evil of firms whose solvency is and should be undoubted. Any tendency of this sort is to be roundly deprecated. The sanguine and energetic man, full of ambition to extend his business, who may have branched out beyond what he had cash to pay for, and who may be somewhat in debt, should not have suspicions cast on his solvency by any conservative "money-bags" whose wisdom has entirely come from timidity. We do not think that the investments which have merit, made in the Iron business the past few years, will fail to pay eventually their sanguine promoters.

We must, first of all, disabuse ourselves of the idea that we are in similar conditions to those preceding the crash of 1873. The differences will readily suggest themselves to all who were in trade ten years ago. When a man has got to the bottom of a hill, he can fall no further, and when Forge Iron sells for $18 in Pittsburgh, it cannot go a great deal lower. When people owe nothing, they cannot fail, and when business is largely done for cash, there is no danger of a panic. These trite truisms are well to bear in mind, for, should the revival which has apparently set in continue, there will be pessimists enough left to tell us that the excitement of the fall elections and the dread of the approaching session of Congress will prevent any lasting improvement.

There is no better index of trade than transportation. Within the past week grain freights on the lake have advanced 1¢ per bushel, and Lake Superior Ore freights 25¢ per ton. While it seems almost too good to hope that the advance will be permanent, should such be the case it will justly lead one to think that forces are working which tend to an improvement in our various and large business interests. The demand for vessels at Chicago indicates a good foreign demand for grain. The advance in Ore freights will lessen considerably the shipments of Lake Superior Iron Ore. It is safe to say that 1,500,000 tons of Lake Superior Ore have been sold; the total production cannot exceed 2,000,000 tons. The shipments to August 22 were 1,262,554 tons, being 512,551 tons short of the shipments for the same time last year, and there are but about 2½ months of lake navigation left. It is not extravagant to say that it looks as if all the Lake Superior Ore mined this year will be wanted, and at as good as present prevailing prices; and if the price of Ore is firm, it must have some effect on what is obtained for the product. There are some bright features in the situation, and that matters may so shape that we may be able to elaborate them still more in a future homily is our earnest wish.

CHATTANOOGA.

Office of *The Iron Age*, Market and 8th Sts., Chattanooga, Sept 3, 1883.

There is nothing of special interest in Southern business. Stocks of heavy materials in the hands of producers and dealers are low and constantly declining. The activity in the building trades continues unabated, and materials pertaining to that line are bringing full prices and moving briskly. The city of Chattanooga will handle not less than 25,000,000 feet of lumber during the current year, fully half of which is on account of local consumption. Other Southern towns report similar, if not equal, activity in this line. The weather has been cool during the week, with plenty of rain. The preparations for fall business in various manufacturing lines goes forward unabated, there being especially a "boom" in wood-working concerns.

Pig Iron.—There is nothing new or interesting in the Southern market. Buyers continue the dribbling style of purchasing. Brokers are practically out of stock, and there are no large accumulations at furnaces. Transactions are usually at quotations. We quote No. 1 Foundry $19 @ $20; No. 2 Foundry, $18 @ $19; Gray Forge, $16 @ $19; White and Mottled, $14 @ $15; Car-wheel Metal, $24 @ $26.

Ores.—We quote 50 % Brown Hematite, ₱ ton. $2 @ $2.75; Red Fossil, $2 @ $2.25, delivered at furnace.

Miscellaneous Articles.—Old Rails are steady at $20 @ $22. We quote Wrought Scrap, $18 @ $22; Cast Scrap, $11 @ $14; Old Wheels, nominal, $22.

Nails.—The market continues favorable to producers. Mills are on double turn. We quote at $3, 60 days, 2 % off for cash; job lots, 15¢ higher.

Manufactured Iron.—The Bar Iron market is in fair condition. We continue quoting $2 @ $2.10 for large bills, assorted sizes. Track supplies are in good request. Railroad Spikes, $2.60; Track Bolts, $3.20; Fish Plate, $2.

Coal.—We quote Fancy Lump $3; Common, $2.50; run of mine to manufacturers, $1.75 at mills.

Coke.—We quote Furnace Coke $3 at point of consumption; Foundry, 10¢ @ 12¢ ₱ bushel.

LOUISVILLE.

Geo. H. Hull & Co., Commission Merchants, report as follows, under date of Sept. 1, 1883: There is no noticeable change in the market since our last quotations. We quote for cash, in round lots, as below:

FOUNDRY IRONS.

No. 1 Hanging Rock Charcoal	$25.00 @ 25.50
No. 1 Southern Charcoal	22.50 @ 23.00
No. 1 Hanging Rock Stonecoal and Coke	20.50 @ 22.50
No. 1 Southern Stonecoal and Coke	20.00 @ 20.50
No. 2 " " "	18.50 @ 19.50
"American Scotch"	19.00 @ 21.00
Open Silver-gray	18.00 @ 19.00
Close "	17.00 @ 18.00

MILL IRONS.

No. 1 Charcoal	19.00 @ 20.00
No. 1 Stonecoal and Coke, Neutral	18.00 @ 18.50
No. 2 " " "	17.00 @ 17.50
No. 1 " " Cold-short	17.00 @ 17.50
No. 2 " " "	16.50 @ 17.00
White and Mottled, Cold-short and Neutral	15.00 @ 16.00

CAR WHEEL IRONS.

Hanging Rock, Cold-blast	30.00 @ 33.00
" Warm-blast	23.00 @ 24.00
Alabama and Georgia, Warm and Cold-blast	27.00 @ 28.00
Central Kentucky, Cold-blast	27.00 @ 28.00

W. B. Belknap & Co., Iron and Steel Merchants, Nos. 115 to 121 West Main street, report to us as follows, under date of September 1, 1883: *Bar Iron* is somewhat better in this market, owing to low water, limiting supply, and a growing conviction on the part of buyers that bottom has been reached. There is a weakness to be noted in the Pittsburgh region, but the price had been already discounted by lower river mills. A decline in raw stock would be acceptable to the mills, who claim they have been running on the strength of anticipated reductions. The Agricultural manufacturers are about to start up, and as their demands for stock are always large, we look for a healthy tone to prevail. *Hoop Iron.*—Nothing doing, compared with former years. *Bands* are firm at the reduction of the association. Bar Mills have ceased to solicit at any special cuts. *Sheet.*—The heavy sizes are very firm, and mills seem to be well supplied with orders. The lighter gauges, which have been scarce for several years at this season, are in excessive supply and gain no strength. *Steel.*—There is no change in price. We note a moderate jobbing demand. *Nails* are in good supply once more, and price seems firm at the slight concessions made incident to starting. *Wire* is in good demand, and further concessions seem needless to effect sales. General trade is good. Most of the merchants declare the past month to have been the best August they ever knew. Margins are unpleasantly close, but credits are closely scanned, and the loss so far by bad debts hereabouts has been unusualy light.

BALTIMORE.

W. N. Wyeth, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of Sept. 3, 1883: Trade for the past week has ruled active, and we have to report quite a change for the better in this respect. Values, however, remain unchanged, but firmer, as per annexed figures:

Ref. Bar Iron, 1 to 6 x ⅜ to 1	₱ lb	2¼ @ 2.35¢
" " 1 to 4½ x 1½ to 1	₱ lb	2¼ @ 2.35¢
" " ½ to 2, Round and Square	₱ lb	2¼ @ 2.35¢
Hoop Iron, 1½ wide and upward	"	3 2-10 @ 3 3-10¢
Band Iron, from 1½ to 6 in. wide	"	2 7-10 @ 2 8-10¢
Horse-shoe Iron	"	3¼ @ 3½¢
Norway Nail Rods	"	5¼ @ 5½¢
Black Diamond Cast Steel	"	11 @ 12 ¢
Machinery Steel	"	4½ @ 5 ¢
Spring Steel	"	4 @ 4¼¢
Common Horse Nails	"	10 @ 11 ¢
Railroad Spikes, 5½ x 0-16	"	2 6-10 @ 2 7-10¢
Perkins' Horse Shoes, ₱ keg of 100 lb		$4 37½
" Mule Shoes		5 37½

R. C. Hoffman & Co., Pig and Railroad Iron Merchants, No. 21 South Frederick street, writes as follows, under date of Sept. 3, 1883: The Iron market continues dull and depressed; sales light and for immediate use only. Prices remain without material change. We quote as follows:

Baltimore Charcoal Wheel Iron (all Baltimore Ore)	$28.00 @ 30.00
Virginia C. B. Wheel Iron	28.00 @ 30.00
Anthracite, No. 1	21.00 @ 24.00
" No. 2	20.00 @ 24.00
" No. 3	17.00 @ 19.00
" Mottled and White	15.00 @ 16.00
Charcoal C. B. Blooms	50.00 @ 55.00
Refined Blooms	41.00 @ 45.00

ST. LOUIS.

Hoffer & Co., Pig Iron and Iron Ore Merchants, 214 Pine street, report to us as follows, under date of Sept. 1, 1883: There is no perceptible change in the condition of the market. There will no doubt be more Iron sold from now on, but there is nothing very promising to report. We continue quotations:

HOT BLAST CHARCOAL IRONS.

Missouri	$20.00 @ 20.50
Southern	20.00 @ 21.00
Ohio	25.00 @ 26.00

COAL AND COKE IRONS.

Missouri	20.00 @ 20.50
Southern	18.50 @ 20.00
Ohio	20.00 @ 25.00

MILL IRONS.

Red Short	18.50 @ 20.00
Neutral	17.00 @ 18.00

CAR WHEEL AND MALLEABLE IRONS.

Missouri	21.00 @ 22.00
Southern	25.00 @ 28.00
Ohio	23.00 @ 32.00

CINCINNATI.

September 3, 1883.—*Pig Iron.*—The market in the past week has been steady in prices and demand. Southern makers continue to press the market for both present and future deliveries of Foundry and Forge grades, and it is reported that the sellers will accept even lower figures than have yet been reported. The Irons of this region are held firmly at last week's quotations, and find liberal takers among the users of the Alabama Coke kind to kill shrinks and to give fluidity to the mix and finish to the castings. The following quotations are predicated on reported sales in the past week:

Best Hanging Rock Charcoal Foundry	$24.00 @ $24.50
Good No. 1 Hanging Rock Charcoal Foundry	24.00 @ .....
Southern Hanging Rock Charcoal Foundry	21.00 @ 22.00
Best Hanging Rock Coke Foundry	21.50 @ 22.00
Good Hanging Rock Coke Foundry	20.50 @ 21.00
Good Southern Foundry	19.50 @ 20.00
American Scotch Hanging Rock Foundry	21.00 @ 21.50
Silver-Gray Softeners	18.00 @ 20.50
Forge, covering all grades	17.00 @ 22.50
Car-Wheel Cold-Blast Charcoal	28.00 @ 30.00
Car-Wheel Warm-Blast Charcoal	25.00 @ 27.00

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(*From Our Regular Correspondent.*)

London, August 29, 1883.

THE WEEK

has been productive of nothing of special importance to your readers, and, generally speaking, matters are very much as they were at the date of my last report, with the exception of the fluctuations of minor moment, which will be found duly noted elsewhere in this letter. Just now the weather is being watched with much anxiety, the harvest being in progress and liable to be affected in either direction to a serious extent. During the past week the southern counties of England, as well as of the southeastern districts, have been favored with high temperatures and a great deal of sunshine, albeit there have been showers here and there, but the wet, curiously enough, has been counterbalanced by high winds which have speedily dried the corn. In the parts indicated, therefore, cutting has been very vigorously prosecuted, and a wide acreage of oats and barley, as well as some wheat, has been harvested in splendid condition, many of the crops of oats and barley being of exceptionally fine quality, although, like the wheat generally, short in straw. In the west and midlands, as well as in the great farming counties of the east, the harvest is not quite so forward, but cutting has been commenced and will be general in the course of the present week, should the weather continue fine. The oats and barley will be good almost universally, but the wheat will be rather below an average crop, besides which the experience of the past few years has been so unfavorable in respect of this prime cereal that in many localities there is much less land under wheat than is ordinarily the case. The North of England and Scotland, as also Ireland and Wales, had a great deal of heavy rain at the beginning of last week, and some of the crops suffered somewhat seriously, but the atmospheric influences have now become more favorable, and there are hopes that harvesting will be commenced toward the end of this or at the beginning of next week. In Scotland, of course, the crops will be very late, which will increase the risk they run from unsettled weather. It should be remembered, nevertheless, that a few days' fine weather enable the farmer nowadays to do much more in the harvest field than as many weeks did a few years ago. The advent of reapers has completely revolutionized harvesting operations. Under the modern system a field of, say, 50 acres is reaped in a single day by a couple or so of machines, whereas 15 or 20 years ago quite an army of men would have been needed to cut it with the hook, sickle or scythe in the same time. I remember, indeed, that the eastern counties were regularly invaded about the end of July by hordes of "wild Irishmen," who were accustomed to come over yearly and to march in gangs of 50 to 300 or 400 each, with their hooks or sickles under their arms, until they secured engagements. For years in succession the same men would appear in the same places and work on the same farms, but the reaping machine ultimately spoiled their vocation and the immigration has now almost come to an end. A few Irishmen still come over to work for farmers of the old school, but they are no longer a factor of importance in the great harvest problem. This season the self-binders are making some progress, string having been successfully substituted for wire by Howard's, Hornsby's, Samuelson's and our other large implement houses making these machines. Henceforward there is every probability of these sheaf binders being very largely used in all parts of Great Britain, the saving of time being of even more importance than the economy of labor thereby effected.

THE IRON MARKET

has been free from other than nominal changes during the week, and may be termed quiet, but fairly steady, in all directions. At Glasgow warrants have been somewhat irregular, with a decline at the beginning of the week, which has since been recovered, Friday's closing prices being 47/1 ₱ ton. In makers' brands of Scotch pig the changes have not been numerous or important, the outside range being 6d. ₱ ton in either direction. Shipments are improving comparatively, and are not unlikely to be benefited by the drop in freights from Glasgow to the United States ports. Stocks increased slightly during last week, and are still sufficiently heavy to entirely prevent any movement for advancing values to any material extent. At Middlesboro' the market is quiet and not at all strong, No. 3 being freely offered at 39/ @ 39/6, despite the efforts of smelters to maintain figures on their own basis of 39/6. The local consumption is good, and shipments are still on a large scale, especially to Scotland, where the consumption of Cleveland pig is well upheld. On the West Coast there is virtually no alteration to report as regards either hematite ores or pig iron, both of which are very low in price and produced in quantities beyond the current requirements of the market. Stocks of ores are rapidly growing, as the raisers prefer to hold for more money than the 9/ @ 11/ now obtained. Mixed numbers of pig iron are nominal at 46/ @ 50/, and makers' brands are equally low. In the present condition of the rail mills I deem an advance quite improbable. In the Midlands and the other smelting localities all kinds of crude iron are nominal, but rather weaker, and no great amount of new business is being done anywhere. At the same time, large deliveries are being made on regular contracts, so that the furnaces are mostly kept fully engaged. In heavy manufactured iron there is no quotable alteration, and the mills are busy; but futures are irregular, and for the most part buyers are enabled to enforce their views. In wire there is no improvement, sales for fencing and netting purposes being reported at figures which are exceptionally low. Should the Post Office order the 15,000 miles of wire required to enable sixpenny inland telegrams to be initiated, the trade would receive a welcome stimulus. In the same way, galvanized sheets are not steady, and are changing hands at prices which are uneven, and often below published rates. The tube trade is once more disorganized, and, if I am rightly informed, the association has in reality ceased to exist. The German houses are alleged to have severed their connection with it, while most of the home makers are also doing what seems best in their own eyes.

In ordinary merchant iron the movements of the week have been unimportant, and prices remain on the basis of £7. 10/ for Staffordshire marked bars. Sheets are in fair request, and some of the producers of hoops, strips and plates have satisfactory order-books. There is no general activity, however, and the attitude of the majority of the mills and forges of this class is one of expectancy rather than of realization. Manufacturers of chains, anchors, cables, anvils, &c., are all doing a moderate turnover, but at low prices. In iron rails the only business on hand is for light sections at special prices. For old rails there are a few inquiries from the United States, but only a limited number of sales have taken place. Heavy wrought scrap is in indifferent request for export at 57/, f.o.b. London cast scrap is nominal and neglected. Freights are easier, pig iron by ordinary steamer from Glasgow to New York being 6/ @ 6/6 ₱ ton, and other rates are proportionally lower. Steel is again without special features to note. The majority of the Sheffield houses are only moderately engaged, with the exception of a few of the older concerns, which are doing well on special sorts, steel castings, &c.

The Bessemer concerns are tolerably busy on rolled sorts, bars being called £8 @ £8. 10/; hoops, £8 @ £8, 15/, and sheets or plates, £11. 10/ @ £14 ₱ ton. Crop ends are quoted at 60/ ₱ ton, f.o.b. Wales, &c. Old railway leaf spring steel is without inquiry. Steel rails are unsettled and nominal for reasons alluded to in my last. There are a few inquiries in the market, but, so far as I have been enabled to ascertain, the report as to an Indian order for 80,000 tons having been taken at £4 ₱ ton, f.o.b., is without foundation. I learn that the London, Brighton and South Coast Railway Company have ordered 15,000 tons of 80-lb. D. H. rails, and that the order has gone to West Cumberland, but at what price is not accurately reported. It is supposed to be £4. 10/ ₱ ton, but whether that limit is at the works, f.o.b. or delivered, is a matter of conjecture. It is certain, in any case, that the nominal quotations of £4. 15/ @ £5 ₱ ton are very widely departed from just now. Tin plates are featureless, and, if anything, a trifle weaker than they were a week ago. The demand from all quarters is very quiet, and there is rather a want of confidence in the future of prices, owing to the recent increase in the number of works in operation. It is generally believed that the production has again outdistanced the consumption, and that, therefore, the stocks are perceptibly increasing. I quote, f.o.b. Liverpool, coke tins, buyers 15/9 @ 16/, and sellers 16/ @ 16/6; coke tin wasters, 14 x 20, 14/9.

SCOTCH PIG IRON

has been very quiet since I last wrote, with only a limited amount of business doing in warrants, although there has been, and is, a moderate turnover in special brands. There are 114 furnaces (including 7 on hematites) now at work in Scotland, as against 110 this date last year. In Connal's stores, at Glasgow, there are 585,018 tons of pig iron stored, as compared with 630,978 a year ago. There was an increase of 580 tons last week. Shipments to date have been 395,257 tons, or 2905 tons more than in 1882 to same date. Last week's shipments were 796 tons ahead of those for the corresponding week of last year. Warrants are now 47/1, against 50/ last year, same date, the bank rate being 4 % in both cases. Imports of Middlesboro' pig iron into Scotland this year, to date, have been 162,524 tons, an increase of 26,549 tons over last year. Writing from Glasgow on August 18, James Watson & Co. said: "The Scotch iron market has been very inactive this week, only a restricted business being done. There is a fair business doing in special brands, but G.M.B. is in quiet demand. The warrant market here was flat on Monday last, the price dropping from 46/11½ to 46/10½ ₱ ton. On Tuesday the price improved to 47/2, cash, while on Wednesday it was irregular, a fair business being transacted between 47/0½ and 47/2 ₱ ton. Yesterday it was quiet at 47/1½ and 47/1, and to-day a limited trade was done at 47/0½ and 47/1, closing with buyers at the latter figure. The shipments last week were 14,054 tons, as compared with 13,258 tons for the corresponding week of last year." We quote:

	No. 1.	No. 3.
G. M. B., at Glasgow	48/6	46/
Clyde, "	50/6	48/6
Coltness, "	60/6	52/9
Langloan, "	60/	52/9
Gartsherrie, "	57/	53/
Summerlee, "	57/6	51/
Calder, "	57/6	50/6
Carnbroe, "	55/	49/
Glengarnock, at Ardrossan	55/	47/6
Eglinton, "	49/	45/6
Dalmellington, "	49/	48/
Shotts, at Leith	59/6	55/
Kinneil, at Bo'ness	49/	47/6
Carron, at Grangemouth	49/	47/6

MIDDLESBORO' PIG IRON

is very flat, partly owing to the interruption of business caused by the occurrence of Stockton races and other local holidays which have attracted the men away from the mills and forges, and so lessened the consumption of pig iron. The shipments continue good, but the future of shipbuilding is regarded with so much doubt that values have no tendency whatever to rise, but rather the contrary. For No. 3, 39/ is being readily accepted, although quotations range up to 39/6, for which makers stoutly, but vainly, hold out. For G.M.B., f.o.b. at makers' wharves in the Tees, net cash, less 2½ %, current prices are:

No. 1 Foundry	43/	Mottled	37/6
" 2 "	41/	White	37/
" 3 "	39/	Refined Metal	55/
" 4 "	38/6	Kentledge	40/
" 4 Forge	38/	Cinder	34/

Preparations are being made for the meeting of the Iron and Steel Institute at Middlesboro', &c., next month, a large muster being anticipated.

WEST COAST HEMATITES

are still in slow request and must be deemed nominal in price, in spite of all assertions to the contrary. There is scarcely any new demand on export account, although a few lots are being delivered on old contracts, and the home consumption is by no means up to the level of the past two or three years at this season. For mixed numbers 49/ @ 50/ ₱ ton is quoted, and makers' own brands are as under:

	No. 1.	No. 2.	No. 3.
Cleator	56/	54/	51/6
Lonsdale	51/	50/6	50/
Workington	51/	50/6	50/
Lowther	51/	50/6	50/
Distington	51/	50/6	50/
Harrington	51/	50/6	50/
Solway	51/	50/6	50/
Maryport	51/	50/6	50/

Ores are quoted at 9/ @ 11/ at the mines, while Spanish of 54 % is 13/ @ 14/, ex ship. Last week's shipment included 8142 tons of pig iron and 3389 tons of steel rails.

SHIPBUILDING AND FREIGHTS.

There is a very general impression that shipbuilding has been carried to extreme limits in this country and Scotland of late years, and it is feared that the oversupply of tonnage will shortly have the natural effect of bringing about a very serious contraction of business in the shipbuilding yards. In a general way, this point is one which distinctly benefits all branches of our commerce, seeing that low rates of freight afford advantages of no mean order to all exporters and shippers, as well as to importers of raw materials and food products. To the iron trade, however, any considerable decrease in the shipbuilding branch would be a most serious matter, inasmuch as the briskness of the plate mills in the North of England, and of sundry allied industries elsewhere, has been largely owing to the enormous production of the shipyards. It is, therefore, of some importance to find that the shrinkage of freights is likely to prevent further capital from being invested in ships.

TIN PLATES

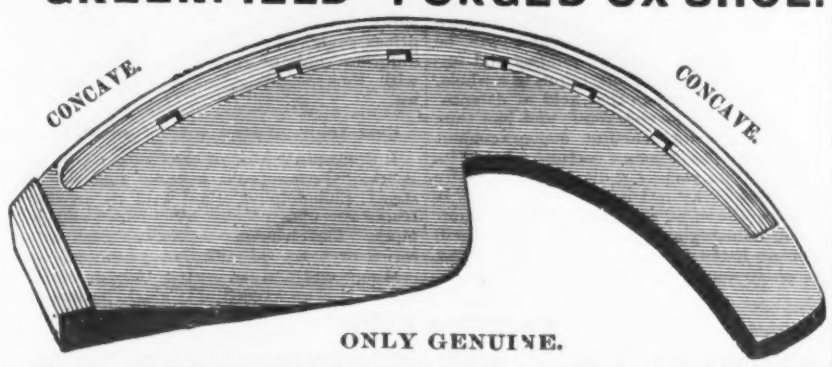
remain quiet and somewhat nominal in price, the American demand of late having been below the anticipations formed of it. Another potent cause of the lowness of selling prices is the restarting of several mills, by which the production is so much increased as to once more bring it in excess of the wants of the market. Messrs. Caine & Layborn, of Liverpool, advise me and quote as follows: "The business in this department of trade during the month has been very disappointing. The demand has not been active, and prices consequently are sluggish and in favor of buyers. Wasters are still scarce and in good demand, and command high prices relatively to primes."

Best charcoal	19/6 @ 21/	₱ box, I.C.	
2d "	18/6 @ 19/	"	
Best coke	17/6 @ 18/	"	
2d "	17/ @ 17/6	"	
Com. Coke	10/3 @ 16/9	"	
" " (Wast)	14x10, 14/9 @ 15/	"	I.C.W.
" " (")	14x20, 15/ @ 15/3	"	

The new vault to be constructed in the Treasury Building at Washington for the storage of silver dollars will be in the subbasement of the north wing, two stories below the cash room, and directly under it. The elevator will be carried down another story, so as to connect the vault with the other rooms. The vault will be 55 feet long and 35 wide, and will have storage room for 42,000,000 silver dollars. It will be divided into a central passage and 18 stalls, the stalls being 6 x 13 feet in size, and holding nearly $2,500,000 each. The partitions are to be of iron lattice-work, and each compartment will have a lock. The floor, top and sides of the vault will be lined with welded steel and iron.

The Government of Hayti is placed in a serious dilemma by the revolutionists. If we may believe the published accounts, her main reliance just now is upon the timely arrival of the war steamer which Neafie & Levy, of Philadelphia, have been fitting out on her account. To effect this object, President Salomon wants a loan of $150,000, offering good real estate security. Frazier & Co., of New York, who furnish the arms, agree with the builders that the steamer is intended for the West India fruit trade.

"GREENFIELD" FORGED OX SHOE.



ONLY GENUINE.

We now con'rol the Patents for these Shoes, having succeeded the Greenfield Tool Co. in their manufacture and sale. Recent decisions of the United States Court have sustained the validity of these patents, giving us exclusive right to make Concave Ox Shoes. We believe them to be the best and best-selling shoe in market, and offer them with the fullest guarantees. With our facilities we can fill large orders at short notice, and are now ready to do it.

No. 1, Full Length, Concave, 5 inches, Weight, per Set of Eight Shoes, 3 pounds.
" 2, " " 5½ " " " " 3½ "
" 3, " " 6 " " " " 4 "
" 4, " " 6½ " " " " 5 "

Packed in boxes or kegs of 100 pounds, half each rights and lefts. Full weight, and no charge for packages.

PRICES.

For orders of 1 ton or more.....11 cts. per pound.
" 1000 lbs. or more.....11½ " "
" 500 " " .....12 " "
" less than 500 lbs.....12½ " "

Terms, Net Cash, 30 days.

MILLERS FALLS CO.,

74 Chambers Street, New York.

FACTORY, - - - - - - - - Millers Falls, Mass.

CHAMPLAIN
Forged Horse Nails.

MANUFACTURED BY THE

NATIONAL HORSE NAIL CO.,

Vergennes, Vermont.

HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST NORWAY IRON AND WARRANTED.

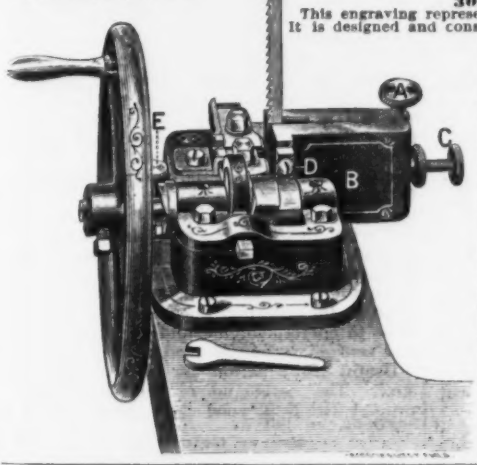
WAREHOUSE

97 CHAMBERS AND 81 READE STREETS NEW YORK.

DURRIE & McCARTY, Sole Agents.

Amesbury's Band Saw Setting Machine.

Patented, May 2, 1882.



WILL SET SAWS FROM ¼ INCH TO 2 INCHES WIDE ACCURATELY AT THE RATE OF

300 Teeth per Minute.

This engraving represents our new Band Saw Setting Machine. It is designed and constructed upon entirely new principles, and embodies all the good features of hand-work in combination with the speed and regularity of machine work. The users of band saws have long felt the need of a machine that would hold a narrow saw in a rigid position and set the teeth without straining the blade; and in response to inquiries from many of our leading manufacturers, we have perfected a machine that will set the teeth on any band saw without in any manner affecting the blade. It is arranged to work by an easy, uniform crank motion, and when the tooth to be set is fed into position, the blade is firmly locked between the steel jaws of a vise, and remains immovable while the tooth is set to any degree required. As the crank goes forward the blade is released, when the next tooth is fed up to the dies, the blade again locked in vise, and this tooth set in the opposite direction. All these movements are automatic, and can be carried on at a speed of 300 teeth per minute. The feeder picks up *only the tooth that is to be set*, consequently each tooth is fed to its proper position, *regardless of their irregularity*. No further expense is required outside of the machine, as the band saw is simply hung up over the machine on a wooden bracket, and the lower part left pendant near the floor.

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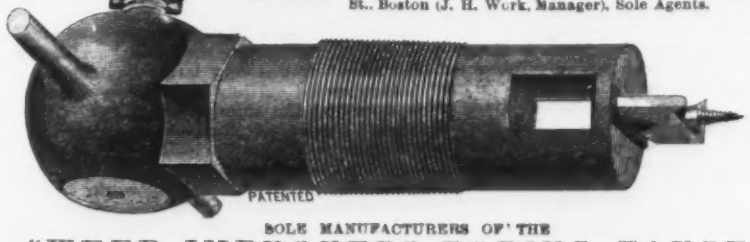

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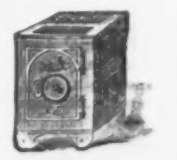

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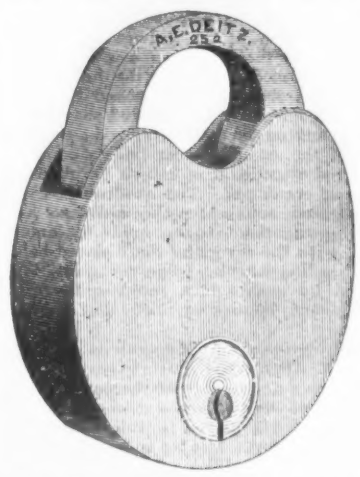

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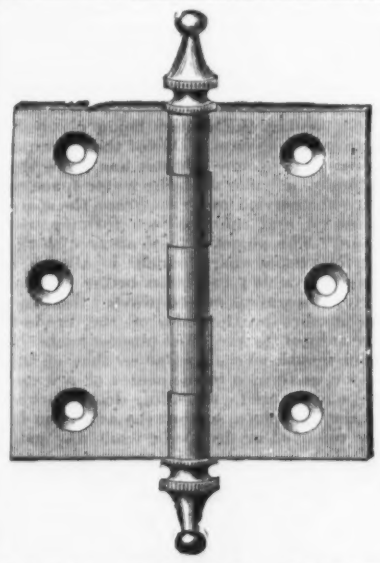

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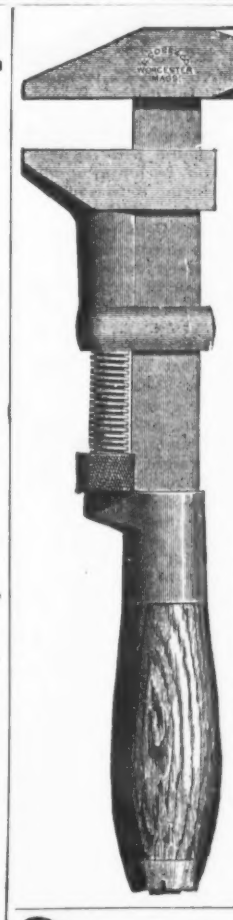

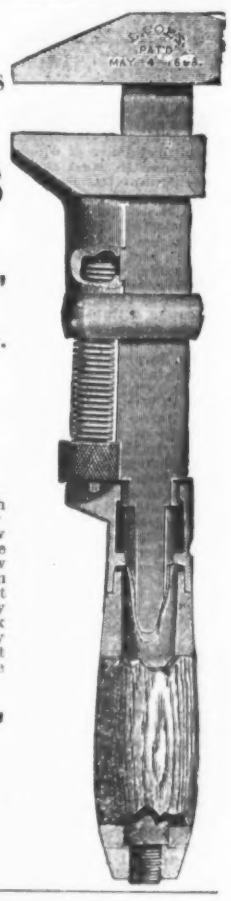

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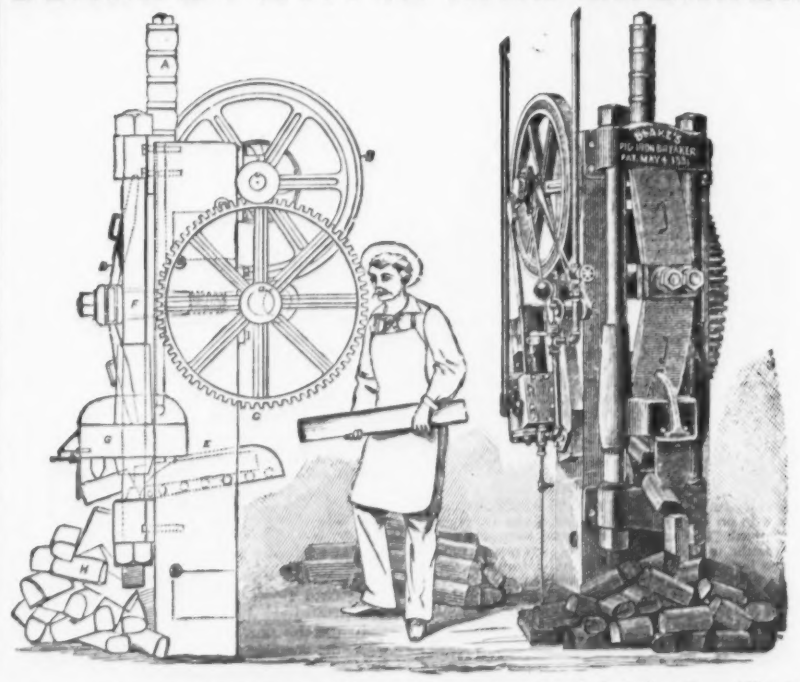

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FOREIGN.

FRANCE.

(Moniteur des Interets Materiels.)

PARIS, August 20, 1883.—*Metals.*—Business might be more active; the feeling here is decidedly less buoyant, in consequence of the accounts from the agricultural districts, which are not so favorable with respect to crops as they have been. Metals have therefore been duller and lower. We quote at the close: *Copper.*—Clift Bars, 163 75 @ 167.50 francs ₱ 100 kg.; Ingots and Slabs, 171.25, and Best Selected, 175; Pure Corocoro Ore, 170. *Tin.*—Banca, 252.50; Billiton and Straits, 250; Australian, 250, and English, 247.50. *Lead*, 31 @ 31.75, and *Spelter*, 39.50 @ 40. *Iron.*—In this branch there is greater confidence manifested since the Chamber of Deputies ratified the Government arrangement with leading railroads. At the North, where but quite recently everything was flat, and the output had been reduced, the tendency it at present decidedly the other way; yet they maintain the moderate quotation of 16 @ 16.50 francs ₱ 100 kg., Charcoal do. selling at 24. Sheets at 23 @ 26 and Wire Nails, No. 18, in bulk, at 27. In the Haute-Marne there has been greater activity on the basis of 18 50 @ 19 francs. Merchant. At Longwy, in the Meurthe and Moselle, on the contrary, business has relapsed into an expectant attitude. Meanwhile stocks of Pig Iron have run very low in that district. They sell White Pig 6.20, and Foundry, No. 3, 7.80. In the Center, at St. Etienne, great activity is noticeable at the Steel works, both for the navy and in Rails, of which the Southern Railway ordered 15,000,000 francs' worth. *Coal* is in good position and firm.

BELGIUM.

(Moniteur Industriel.)

BRUSSELS, August 12, 1883.—*Iron.*—Our market shows no decided symptoms either way; the fact is that the campaign has not yet opened, many leading merchants and manufacturers not yet having returned to active business, but the feeling is decidedly cheerful and the prospect for a revival encouraging; especially at Charleroi there is great firmness in the Iron market. English Pig Iron has been dealt in at a decline of 50c ₱ ton. Foundry Pig is worth 7.25 francs ₱ 100 kg. at Charleroi, and Puddling 5.50. No. 1 Merchant sells at 13, but may occasionally be shaded 50c. The import of Iron Ore into Belgium the first six months of the year has been 766,835 tons, against 592,853 last year, and the export 218,001, against 164,612. Steel Rail importation 37,041 tons, against 448 exported. The import of Pig Iron has been 9983 tons, against 7742 in 1882, and the export 84,632, against 88,359. Nail importation amounted to 17 975 tons, against 20,734 tons last year, and the export to 1763, against 2885. *Coal* has not been very active, but the situation is acknowledged to be excellent and prices remain quite firm. The import of Coal into this country during the first six months has been 583,603 tons, against 410,905 in 1882, and the export 2,027,023, against 1,998,696. At Mons Coal for industrial purposes sells at 11 @ 12 francs, and for households at 17 @ 19. Coal for Coke sells at Charleroi at 10.50. At Liege domestic continues to sell at 18.50 @ 19. Coke is inactive at 15 @ 15.50.

GERMANY.

(Borsenhalle.)

HAMBURG, August 22, 1883.—*Iron.*—Not much change has occurred since our last report. For the moment everything is weak, although the last few days there has been more doing in Westphalia, which looks like an indication that there, at least, consumers begin to think that bottom has been touched. Puddling Pig has latterly been a little more active, enabling blast-furnace owners to maintain their prices, the more so since they carry but light stocks. In Bessemer Pig and Foundry the demand, though not lively, is steady. Spiegel, on the other hand, feels the lack of an export demand. The improvement in Bar Iron has not been sustained. Although the demand for Pig has been better, no large contracts transpire, chief consumers still preferring to temporize. Quotations at Dusseldorf, ₱ ton, are as under: Spiegel, 62 @ 64 marks; White Pig, 55; Luxembourg, 40; Charcoal, 76 @ 82; Foundry Nos. 1 to 3, 72 @ 59; Spanish Mudela Foundry, 80 @ 82; English Pig, No 3, 60 @ 62; English Bessemer, at port of shipment, 49; Spanish Mudela do., at Rotterdam, 61 @ 62; German Bessemer, 57 @ 58; Merchant, 130 @ 150; and Sheets, 175 @ 125. *Metals* have been weak, and the ensuing quotations may be shaded: German Pig Lead, which is dull, 13 @ 13.25; Copper quiet; Lake at 76; other brands, 70 @ 78; Tin inactive, 105 @ 108; Spelter, without anything doing, 15.15 @ 15.50.

HOLLAND.

(Koch & Vlierboom.)

ROTTERDAM, Aug. 18, 1883.—*Tin.*—Our market has been excessively quiet, with some dealings in Banca, spot, at 56.50, and Billiton do. at 55.50, while distant afloats of the latter are worth 56. At this decline there has resulted more business, leading to a recovery of 50¢, Banca selling at 57, spot, and 57.50, deliverable from the next sale, while Billiton, spot, sold at 56, and distant futures at 56.75.

AUSTRIA.

(Austrian Trade Journal.)

VIENNA, Aug. 21, 1883.—*Iron.*—The satisfactory condition of the Iron market in Austro-Hungary induced some makers of Structural Iron to raise their prices, but they have not succeeded in firmly establishing this advance, which, moreover, would only invite importation if they did. In other branches of the Iron trade, wherever works have plenty of orders on hand, these ask an advance, but, also, so far with but partial success. Sheet Iron, on the other hand, tends still upward without much of an effort to push it. Merchant Iron has remained steady at 130 florins, Styrian, and 120 Bohemian, a moderate trade transpiring thereit. This may also be said of Pig Iron. The trade in Tools and Hardware has not yet been properly started, but prospects, as regards these, could hardly be better, for, with the fair cereal and other crops in Austro-Hungary, the purchasing capacity of the agricultural populations is sufficient to warrant a good fall campaign in these goods.

EAST INDIES.

(Dummler & Co.)

BATAVIA, July 14, 1883.—*Tin.*—The Billiton Company's sale on the 27th ult. of 18,700 Slabs averaged 64.43 ₱ picul. The next sale of about as much, say, 19,000 piculs, is to come off on the 29th prox., to be followed by sales of equal amount October 30, December 22, February 26, 1884, and April 29. No landings from Banca in June. Swedish *Iron* has found buyers at 9 guilders, and continues difficult of sales; English Bars, Round and Square, assorted, have brought 6.75, and Corrugated Galvanized Sheets, 14; nothing doing in Hoops and Common Sheets. English *Copper* Sheathing, assorted sizes, has been taken at 67; *Wire Nails* saleable at 10.75 @ 11. *Petroleum.*—Arrivals from New York since January 1 sum up 556,704 cases. *Coal.*—Arrivals since January 1—14 471 tons from England and 22 147 from Australia. *Exchange*, $11.93 @ $11.97½ ₱ £, 6 months' sight on London.

(Schmidt, Kustermann & Co.)

PENANG, July 14, 1883.—*Tin.*—Since 20th ult. the market opened at $29 55 for Tongkah and $29.90 Larut, and after a few slight fluctuations now closes at $29.30 and $ 9.70, respectively. Receipts, 12,000 piculs, of which Chinese took 6000 and Europeans 1800. *Exchange*, 3/8.

(Hesseuauer & Co.)

COLOMBO, July 20, 1883.—*Plumbago.*—A small business has been transacted at ensuing rates, in rupees, ₱ ton: Fine Lump, 140 @ 150; Ordinary, 125 @ 130; Chips, 60 @ 70, and Dust, 40 @ 50. Shipments have been since October 1: 86,054 cwt. to England, 205 to Trieste, 705 to Havre, 1116 to India, and 117,703 to the United States—together, 207,753, against 134,741 in 1882; 137,843 in 1881, and 154,374 in 1880. *Exchange*, six months' sight, 1/7 15-16.

The machinists of New York and vicinity are about to form a union. Their grievance is that they do not receive as much pay as they did when their labor was in demand at $4 to $5 per day.

Compound Locomotive Engines.

In a paper on the above subject, recently read before the British Institution of Mechanical Engineers, Mr. Francis W. Webb stated that about five years ago he converted an old outside cylinder engine with 15-inch cylinders into a compound, by lining up one of the cylinders and reducing it to 9 inches in diameter. This engine has until the last three months been working light passenger trains on the Ashby and Nuneaton branch of the London and Northwestern Railway, and the elements of success seen in its working led to the construction of the compound locomotive "Experiment," which was what its name implies.

The two main objects Mr. Webb had in view when designing the "Experiment" were, firstly, to attain to greater economy in consumption of fuel; and, secondly, to do away with coupling-rods, while at the same time obtaining a greater weight for adhesion than would be possible on only one pair of driving-wheels without rapid destruction of the road. The driving-wheels being no longer coupled, there is less grinding action in passing round curves, and it is not even necessary that one pair should be of the same diameter as the other.

The engine "Experiment" was constructed at the Crewe Locomotive Works in the latter part of 1881, and has now been at work over 12 months and has run nearly 100,000 miles, chiefly with the Scotch and Irish limited mails. While on this work it made a daily run of 319 miles, and, this being a longer mileage than the engines are accustomed to run in the time, two drivers and firemen were appointed to work the engine, one from Crewe to London and back one day, and the other the day following, in order thoroughly to test the engine in every way before building any more of a similar class. The engine has throughout proved itself to be very steady when running, which is no doubt due to the arrangement of the cylinders; the engine being practically balanced, and having no coupling-rods, is enabled to run at very high speeds.

This principle having been proved correct, it was thought advisable, owing to the increasing weights and the high speeds of passenger trains, that in designing the new engines they should be made more powerful than the present type. Accordingly, the high-pressure cylinders have been increased from 11½ to 13 inches in diameter, leaving the low-pressure cylinder of 26 inches diameter the same as at present, with the exception of the ports, which have been increased from 1½ x 14 to 2 x 16 inches, in order to give more freedom for the exhaust.

The construction will be readily understood from the following description: There are two outside high-pressure cylinders of 13 inches diameter, and one inside low-pressure cylinder of 26 inches diameter, the stroke in each case being the same, namely, 24 inches. The two high-pressure cylinders have their steam-chests placed underneath, in order to allow the valves to fall from their faces, so that there is no wear when the steam is shut off. These two cylinders are attached to the outside frame-plates immediately under the foot plate, about midway between the leading and middle wheels, and are connected through their piston-rods and connecting-rods to the trailing-wheels. The low-pressure cylinder, which has its steam-chest on the top, is placed directly over the leading axle, and is carried between two cross steel plates, one at either end, securely fixed between the main frames; its connecting-rod lays hold of a single-throw crank on the axle of the middle pair of wheels.

The steam is supplied through the regulator in the dome to a brass T-pipe on the smoke-box tube-plate, and thence by two 3-inch copper steam pipes, first running parallel to the tube-plate, then through the back-plate that carries the low-pressure cylinder, and between the plates of the inside and outside frames, to the steam-chests of the high-pressure cylinders. The exhaust steam from these cylinders is returned by two 4-inch pipes running parallel with the high-pressure pipes, through the back-plate that carries the low-pressure cylinder, and into the smoke-box; following round the curved sides of the smoke-box nearly to the top, each pipe passes across to the opposite side, and enters the steam-chest of the low-pressure cylinder through passages in the cover. Thus the exhaust steam becomes superheated in these pipes by the waste gases in the smoke-box, while the large capacity of the pipes themselves obviates the necessity for a separate steam-receiver. The final exhaust escapes from each side of the steam-chest of the low-pressure cylinder into the blast-pipe, and thence to the chimney in the usual way, the only difference being that there are only half the number of blasts for urging the fire compared with an ordinary engine; yet the compound engine steams very freely, and has a blast-pipe of 4⅞-inch diameter for the final exhaust, compared with 4½-inch in engines of the ordinary type.

The steam-chest cover of the large cylinder is provided with a relief valve, so adjusted that the pressure admitted may never exceed 75 pounds per square inch, and a small pipe which is connected to the low-pressure steam pipe, and carried back to a gauge fixed inside the cab, shows at a glance the actual pressure of steam being used in the large cylinder. Arrangement is also made whereby steam direct from the boiler can be admitted to the low-pressure cylinder, which is useful for warming up before starting. The valve motion adopted for this engine is that designed by Mr. David Joy, which does away with all eccentric-rods, and considerably reduces the number of working parts per cylinder, as well as the weight of the valve gear. The arrangement, however, for the new engines differs slightly from that on the "Experiment," in order to do away with the trunnion bearings on the foot-plate. The total number of working or moving parts for the three sets of valve motion in the compound engine is 29, and their total weight 284 pounds, while the number of working parts in the two sets of valve motion in the ordinary standard engine is 24, and their weight 703 pounds, the reversing shafts in each case not being taken into consideration. The valve-chests being on the under side of the high-pressure cylinders, the motion-disks carrying the quadrant bars have to be placed in a corresponding position, and this is done by securing them to the under side of the slide-bars. The quadrant bars, which are made of soft-steel case-hardened, are each grooved to a radius equal to the length of the valve-rod links, and working in their grooves are brass slide-blocks, carried by the lifting links, to the lower end of which is attached the valve-rod link, and to the upper end the compensating link on the connecting-rod; the upper end of the compensating link is controlled by a rod attached to a return crank on the trailing crank-pin. The quadrant bars are lengthened out below the disks, so as to allow attachment to be made by another link, with the reversing shaft placed behind the trailing-wheels. The reversing is effected by means of a screw-and-lever arrangement connected with the reversing shaft.

The high-pressure slide-valves are of the Trick or Allen type, which gives double the lead shown at the edge of the port when the piston is at the end of its stroke; they have a travel of 3⅛ inches in full forward and backward gear. The lap is ¾ inch, and the lead is ⅛ inch; the port opens ¾ inch for admission and closes at 70 per cent. of the stroke. The sizes of the ports in the cylinders are: Steam, ⅛ by 9 inches; exhaust, 2½ by 9 inches. The valve motion of the low-pressure cylinder differs slightly from that of the high pressure. Instead of disks there is a cast-iron shaft, carried in brackets, which are fixed to the inside frames, and the quadrant guides are bolted to it in the middle of its length. The other parts of the motion are similar to those of the high-pressure cylinders, the only difference being that the end of the compensating link in the low-pressure motion is attached to a radius-rod centered on the back-plate of the cylinder. At one end of the reversing shaft is fixed a lever, which is coupled direct by a long rod to the reversing handle on the foot-plate. The travel of the valve in full gear is 4½ inches; lap of valve, 1 inch; lead, 1⅜ inch; the port opens 1 inch for admission and is closed at 75 per cent. of the stroke, and the exhaust closes at 93 per cent. of the stroke. The sizes of the ports are, for steam, 2 by 16 inches; exhaust, 3¼ by 16 inches.

The reversing gears of the high and low pressure cylinders are designed to work independently of each other, and no inconvenience has been experienced by this arrangement; they could, if desired, be connected, but this would mean complicating the parts, while no material advantage would be gained. With regard to the degree of expansion at which the engine is worked, in practice the low-pressure cylinder is kept nearly in full gear, while all the expansion is done in the small high-pressure cylinders, so that no more steam is used than is absolutely necessary to do the work. The commercial results with the engine "Experiment" have been very satisfactory. During the time the engine was working the Irish mail from Crewe to London, and the limited Scotch mail from London to Crewe, the average consumption per train mile was 26.6 pounds of coal, compared with 34.6 pounds, the average consumption of the standard four-coupled passenger engines with 17-inch cylinders and 24-inch stroke, the boilers being precisely the same in each case. One of the principal features in the new engines has been the adoption of a boiler with the water space of the fire-box carried under the grate, the space between it and the fire-bars forming the ash-pan. The object is to do away with the rigid foundation-ring, which is always a source of trouble; to obtain better circulation for the water, and to prevent the lodgment of dirt on the sides of the fire-box where subject to the most intense heat. A flanged mouth-piece, similar to that of the fire-door, is formed in the center of a water space, and covered with sliding-doors worked from the foot-plate, so that the ashes can be easily removed or dropped; while any sediment that may collect in the water space can readily be removed through the wash-out plugs in the sides of the fire-box, there being a clear passage from side to side when the covers are taken off. The mouth of the ash-pan is made of such a width that the tube-plate can be taken out and replaced by a new one without disturbing the other parts of the fire-box.

The engine, although still working on the London section, has been taken off the Irish and Scotch mail trains, because it was not fitted with the gear for working the vacuum brake with which these trains are now provided, and it was not thought advisable to bring the engine into the shops for the present in order to apply the vacuum-brake gear. The new engines, however, are fitted with ejectors and all the necessary gear for working the vacuum brake, and in addition with a steam brake, acting between the two pairs of driving-wheels. This is also coupled to the tender brake-gear, so that the brake is applied to the engine and tender at the same time. A single movement of the engineer's brake-handle serves to apply both the vacuum and the steam brake simultaneously, and similarly to release them together.

TRADE PUBLICATIONS.

Labor-Saving Machinery and Tools.

Wiley & Russell Mfg. Company, of Greenfield, Mass., have just sent us an illustrated price list of their screw-cutting and other labor-saving machinery and tools. It is in the form of a small catalogue, embracing some 40 pages, and will undoubtedly be found serviceable by intending purchasers. Numerous engravings illustrating the different appliances accompany the tables of sizes and prices and other particulars, and in every case impart a fair idea of the general appearance and arrangement of the machinery.

The Louisville Exposition.

The official catalogue of the great Southern Exposition, at Louisville, Ky., which was opened on Aug. 1, 1883, to continue 100 days, has just reached us. As usual in publications of this kind, the catalogue embraces a classification of the exhibits, a list of the exhibitors and numerous other particulars of a similar nature, together with a general plan of the exhibition grounds. Referring to the classification of the exhibits, we find five departments devoted to natural products, machinery, manufactures, transportation, and music, literature and art. These, again, are subdivided into 25 groups, which will be found to contain much of interest and importance. The exposition, taken as a whole, has a wider scope than that held at Atlanta. It is national in its character, and has thus far received the heartiest encouragement from the people of every section. In all its details and its variety of displays it is worthy of the closest attention of every class. It furnishes the most practical means of stimulating industry and developing art, and will be of no little value in practically uniting the whole country.

Tinners' Supplies.

The advertising matter put forth by the N. & G. Taylor Company, of Philadelphia, Pa., has always been of a unique character, and at the same time calculated to serve the best interests of the trade for whose perusal it was intended. In previous notices of publications issued by this house, we have referred to the early volumes that they circulated before the advent of *The Metal Worker*, and when the literature of the tinner's trade was far less than it is at present. Their books at that time contained more that a tinner needed to know than anything else that was in his reach. Of late the character of the publications issued by this house has been changed with a direct reference to the changed conditions in the trade and the requirements of the patrons of the firm, to whom they are addressed. They are always interesting, always valuable to those whose eyes they are intended to reach, and always keep the name of the N. & G. Taylor Company favorably before the public. The volume for 1883, which has recently been issued, is fully up to the high standard which this house has established. It is a pamphlet of 270 odd pages, replete with trade matter in the way of catalogues of various lines of goods, and yet contains much technical information that is of value to the trade. A prominent feature is the private telegraph code which this company has devised for the use of its patrons, by which telegraphic orders can be sent so cheaply as to warrant the frequent use of the wires. A full description of "Hendy," "Old Style" and "Westminster," the special brands of tin plate which the N. & G. Taylor Company warrant with regard to quality, occupy the early pages in the book. Full particulars with reference to the manner of making "Old Style" tin are given in a way to interest all who care to know about the manfacture of the material that they use. A list of the special sizes of tin plate kept in stock by this concern occupies three pages in fine type. Special sizes of tin plate for milk pans, stove doors and other purposes are also given. Following preminary matter of this character are illustrations of creamery goods, cotton-factory cans, cheese-factory articles, can trimmings and various styles of milk cans, succeeding which is a regular list of those goods ordinarily handled by dealers in tinners' supplies. A list of tinners' machines and tools, including cornice machinery, is also contained in the book. A number of useful tables and arithmetical rules, of a character calculated to be of use to those who make calculations in the tin-shop, are presented in the latter part of the book. A unique feature of this volume is a sheet of cardboard which is bound in among the pages, and which has been made to represent galvanized iron. The illusion is so perfect that, at first glance, one would believe that a piece of galvanized iron had been stitched into the book. Another page has been bronzed to imitate sheet copper, while black sheet iron is displayed in a similar manner, these several pages facing the departments in the book in which goods of the kind are described.

Steam Heating.

The Utica Steam Gauge Company, of Utica, N. Y., send us two very beautifully printed and exceedingly attractive little pamphlets devoted to the description and illustration of the steam-heating apparatus which they manufacture. The wood boiler, the wood grate, air-valve and air-box are among some of the principal patents which they hold. One of the circulars is devoted entirely to letters from various parties who have used their steam-heating apparatus and have found it satisfactory. The boiler is of the vertical tubular type, but with a return draft down through the flues, the fire-box being surrounded with water. Tables are given of the sizes and dimensions of various boilers and settings for different kinds of heating, together with particulars of the grate, steam valves, pressure regulators, &c. The catalogue will be found useful by the trade.

Registers and Ventilators.

We have received from Messrs. Hall & Carpenter, of Philadelphia, Pa., their price list for 1883 of warm-air registers, ventilators, &c. The goods represented are those made by the Tuttle & Bailey Mfg. Co., and are in such general use that there is little need of special description at this time. The pamphlet has been carefully prepared, and is arranged in a very convenient manner for reference. By means of wide margins space is afforded for thorough indexing, and portions of the pages being cut away so as to reveal the several titles printed on the margins, it is possible to turn to any item desired instantly. Besides this, a very comprehensive index is presented in the early part of the bock, which still further facilitates references. The list is very complete, and includes prices, together with illustrations, of all the different kinds of registers and ventilators, with their trimmings, that are in general use.

Cast-Iron Water and Gas Pipes

I. S. Cassin & Co., of the Union Hydraulic Works, Germantown avenue and Second street, Philadelphia, Pa., send us an illustrated circular of cast-iron water and gas pipes. The circular consists essentially of a series of some 70 different pipes, shapes, castings and valves which they manufacture. It is an exceedingly good specimen of lithographic work, and as an illustration of the various forms of T's, Y's, crosses, bends, reducers, hubs, &c., is as good a piece of work as we have ever seen, and has the advantage of showing the purchaser exactly what he can obtain. Each casting is numbered, and reference to catalogues thus made easy and certain.

Car Builders' Machinery.

Williams, White & Co., Moline, Ill., have an illustrated catalogue of their special machinery, among which are machines to bend iron shapes, bend arch bars for freight-car trucks, drop-hammers, 6-spindle gang boring machines, skein setters, upright drill-presses, and the Justice spring power hammer. With most of these machines our readers are already familiar. The drop press is a new feature in the form of a connection between the drop and the crank-pin. This consists of a number of strands of manila rope, and is exceedingly effective. The Arch bar-bending machine is applicable to all sorts of agricultural work, and, in fact, any kind of work where iron is to be put into peculiar forms. The Emery jointer is intended for making a close joint between the share and mold-board of a steel plow, and we fancy might be employed for many other kinds of work to good advantage. The company also make small blast furnaces of various patterns. Some of our readers have recently sent queries in regard to the manufacture of such furnaces, and we are glad to be able to mention the address at the present time. The company manufacture, in addition, steam engines up to 24 inches bore, saw mills, couplings, &c.

Steam Pumps.

The George F. Blake Mfg. Company, of 95 Liberty street, New York, have just issued a new illustrated catalogue. Its size is so small, being only 5½ x 7 inches, that it can be readily carried in the pocket, but, notwithstanding this, it is exceedingly complete, and the engravings have been made so fine on the small scale that they are perfectly clear and give as good an idea of the pumps and different mechanisms as larger cuts would. The firm say in a circular to their friends that the catalogue contains all varieties of their improved pumps that they now manufacture. The reading matter in all cases is very full. The different styles of pumps are described, and all needful information given in regard to the work they are capable of doing and the most advantageous points. A great variety of pumps, tables of sizes, prices, &c., are given, which are all very convenient. The omission of prices from a machinist's supply catalogue is not to be wondered at, but it is not desirable in a catalogue of pumps to do this, for, though the prices may change, still they give a relative idea of cost of one size with another, which is also very convenient. The last nine or ten pages of the catalogue are devoted to special information in regard to the parts of pumps, their names, methods for ordering, telegraph code, directions to correspondents and to those using and setting up pumps, and matter entitled "Useful Information on Steam, Water, &c." The catalogue is very beautifully printed and is in good style throughout.

Emery Grinding.

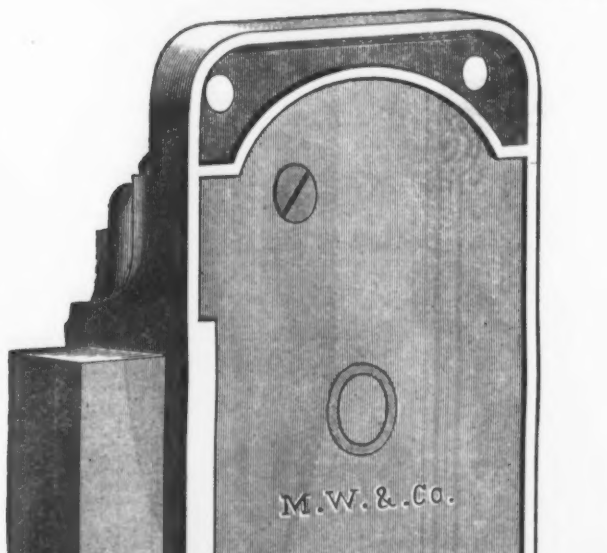
The Gem Emery Wheel and Machine Company, 123 Chambers street, New York, have just sent us a catalogue describing their improved emery-wheel and emery-wheel machinery, together with emery-grinding machinery. Their leading feature is Ware's patent anti-bursting flanges, which, it is claimed, are a perfect protection against accidents from the bursting of solid emery-wheels and grindstones. The method in which they secure this immunity from accident is by distributing the bearing surface of the wheel over a very large diameter, and holding almost entirely by pressure of elastic cushions on the sides of the wheel. They have a variety of emery-wheel machinery, from the lightest affair with a single wheel up to the largest and most complex grinder for doing large and difficult work. They have file, skate and blade grinders, stove-plate grinders, ring grinders, edge-dressing machines, truing wheels and a grinding and polishing machine. The latter is automatic and self-feeding, and especially adapted to squaring up the ends of spiral springs, hinges, butts, &c.

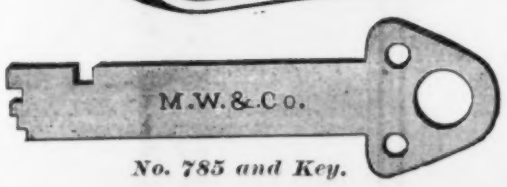
The iron and steel shipbuilding industry on the Delaware River is said by the Philadelphia *Press* to have expanded since the beginning of the present year with wonderful rapidity. The tonnage of iron and steel vessels constructed during the first half of 1883 largely exceeded that of the entire year 1882, the figures being 55,079 and 40,097 respectively.

MALLORY, WHEELER & CO.,

Lock Manufacturers,

NEW HAVEN, CONNECTICUT, U. S. A.





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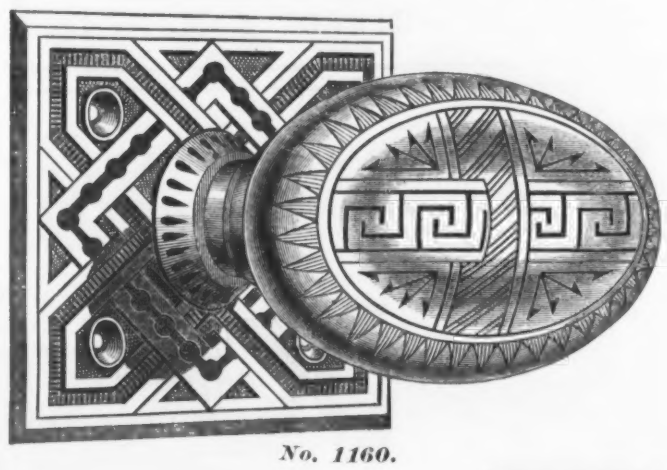

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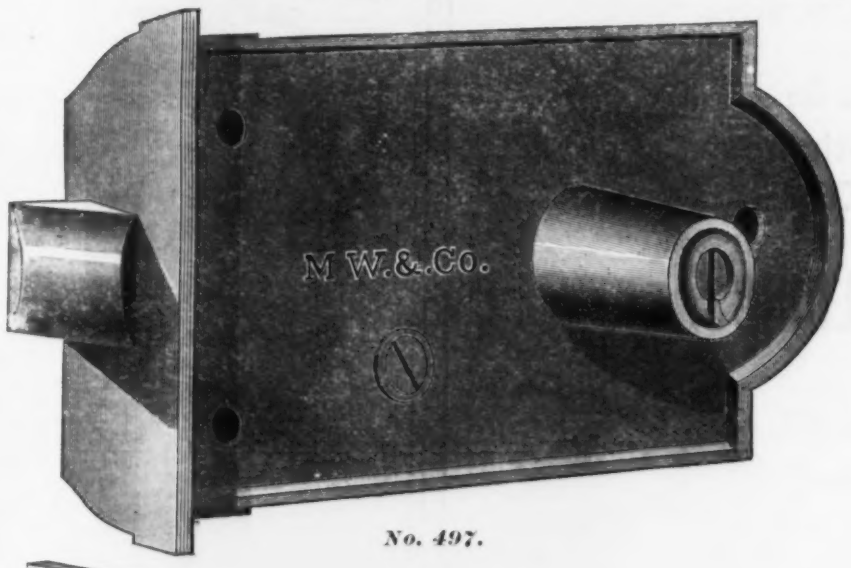

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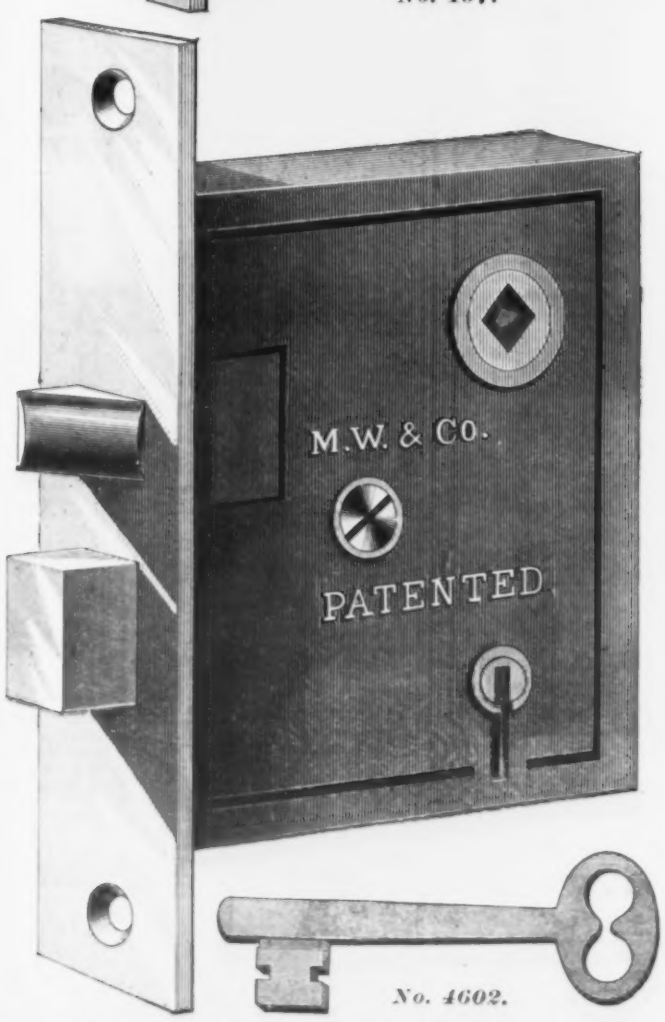

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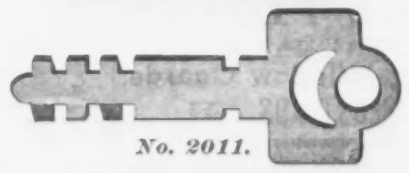


No. 2011.

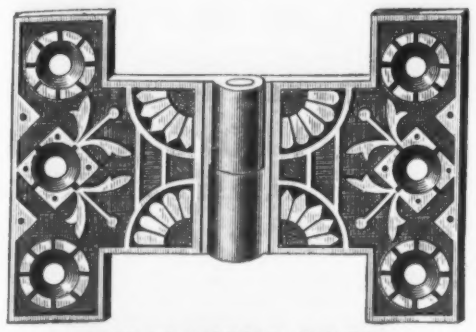
No. 2012.

No. 2010.

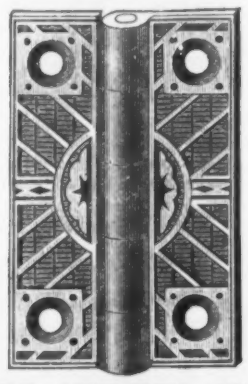
SARGENT & CO., Agents for M., W. & CO., 37 Chambers St., New York.

SARGENT & CO.,

HARDWARE MANUFACTURERS, NEW YORK, and NEW HAVEN, CONN.

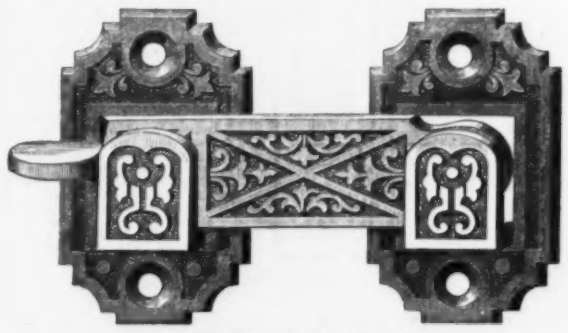


PARLIAMENT BUTTS.
Berlin Bronzed and Bronze Metal.

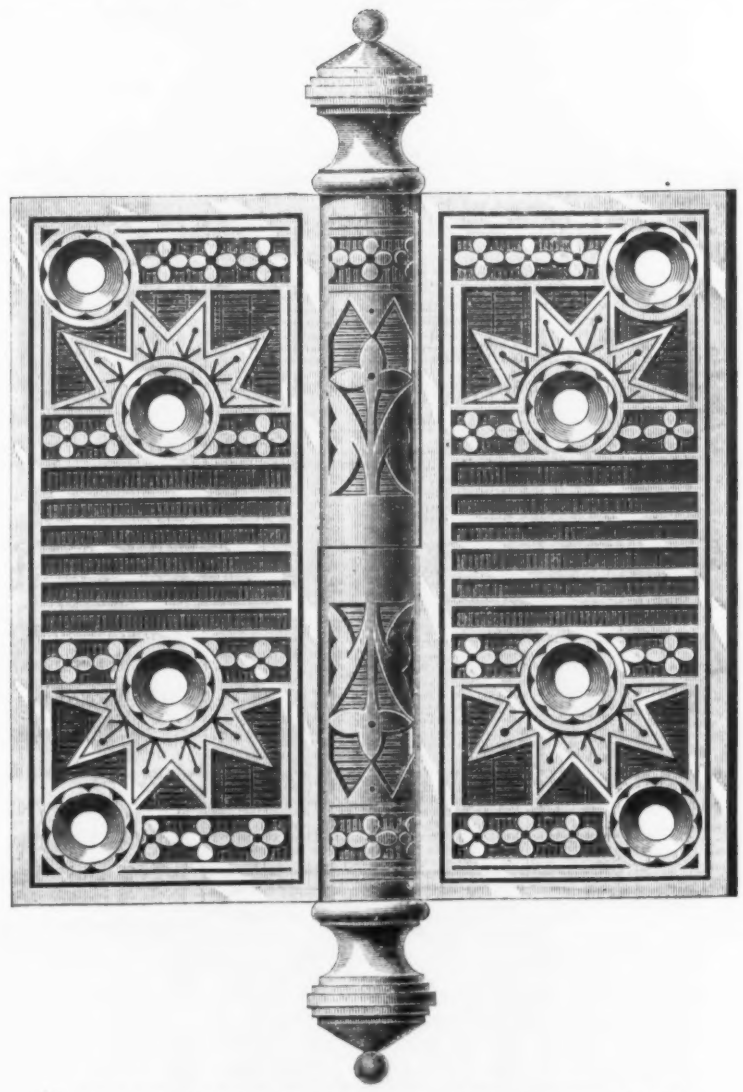


INSIDE SHUTTER HINGES.
Berlin Bronzed and Bronze Metal.

INSIDE SHUTTER HINGES.
Berlin Bronzed and Bronze Metal.



SHUTTER BARS.
Berlin Bronzed and Bronze Metal.

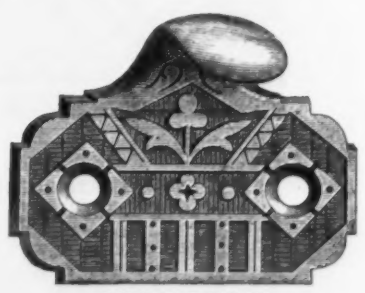


LOOSE JOINT BUTTS. No. 896, Bronze Metal.

SHUTTER BARS.
No. 144, Bronze Metal.

DOOR PULLS, Bronze Metal.

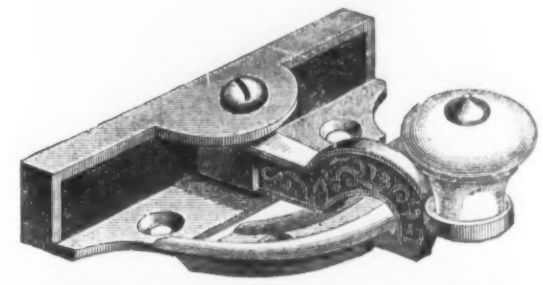
SASH LIFTS.
Berlin Bronzed and Bronze Metal.



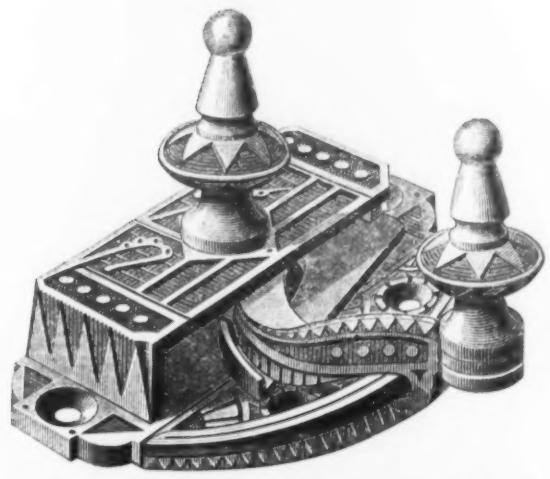
SASH LIFTS.
No. 842, Bronze Metal.

WINDOW PULLEYS.
Plain Iron, Bronzed Face, and Brass Face.

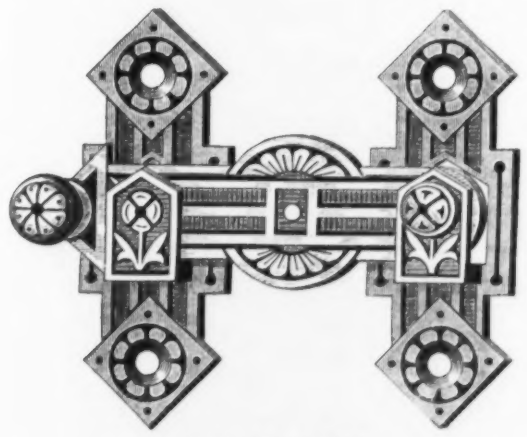
LETTER BOX PLATES. Berlin Bronzed and Bronze Metal.



SASH FASTENERS, Iron and Brass.



BURGLAR-PROOF SASH FASTENERS.
Berlin Bronzed and Bronze Metal.

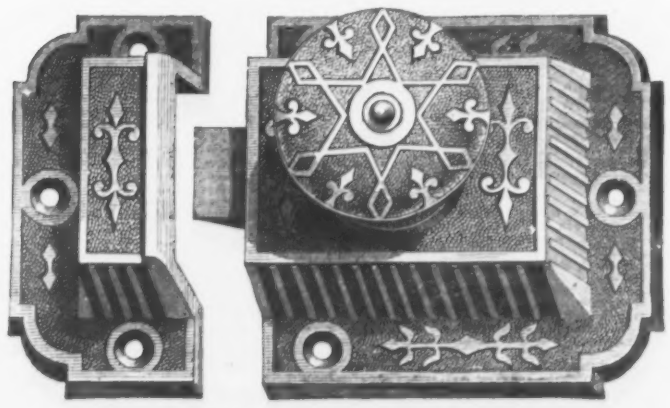


SHUTTER BARS.
Berlin Bronzed and Bronze Metal.

FLUSH SASH LIFTS.
Berlin Bronzed and Bronze Metal.

SHUTTER KNOBS.
No. 64, Bronze Metal.

SHUTTER KNOBS.
Berlin Bronzed and Bronze Metal.



CUPBOARD TURNS.
Berlin Bronzed and Bronze Metal.

NEW YORK WHOLESALE PRICES, September 5, 1883.

(For Wholesale Hardware Prices See Pages 42, 43.)

METALS.

IRON.—DUTY: Bars, 8-10c to 1 1-10 c ₩ lb; provided that no Bar Iron shall pay a less rate of duty than 25 per cent. Sheet, 1 1-10 c to 1 5-10 c ₩ lb. Band, Hoop and Scroll, 1 c to 1 4-10c ₩ lb. Pig and Scrap, 3-10 of 1 c ₩ lb. Plate, 1¼ c ₩ lb. Railroad Bars weighing more than 25 lb ₩ yard, 7-10 of 1 c ₩ lb.

American Iron		
Foundry, No. 1	₩ ton	$22 00 @ 23 00
Foundry No. 2	₩ ton	19.50 @ 21.00
Gray Forge	₩ ton	18.50 @ 19.50
Scotch Iron.		
Eglinton	₩ ton	21.00
Carnbroe	₩ ton	22.50 @ 24.00
Coltness	₩ ton	23.50
Shotts	₩ ton	23.50
Glengarnock	₩ ton	22.50 @ 23.00
Gartsherrie	₩ ton	23.00 @ 23.50
Langloan	₩ ton	23.50
Summerlee	₩ ton	23.00 @ 23.25
Carron	₩ ton	23 00
Dalmellington	₩ ton	21.00
Rails.		
Steel, at Eastern mills	₩ ton	37.50 @ 38.00
Old Rails 78		23.00 @ 24.00
Scrap.		
Wrought, ₩ ton from ship and yard		23.50 @ 25.00
Bar Iron from Store.		
Common Iron		
⅜ to 1 in. round and square	₩ lb	2.1c @ 2.20c
1 to 6 in. x ⅜ to 1 in.	₩ lb	2.1c @ 2.20c
Refined Iron:		
⅜ to 2 in. round and square	₩ lb	$2.30 @ 2.40c
1 to 6 in. x ⅜ to 1 in.	₩ lb	$2.30 @ 2.40c
1 to 6 in. x ¼ and 5-16	₩ lb	2 50 @ 2.60c
Rods—⅜ and 11-16 round and square	₩ lb	2.40 @ 2.50c
Bands—1 to 6 x 3-16 to No. 12	₩ lb	2.70 @ 2.80c
Norway Nail Rods		5 @ 5¼c

Sheet Iron.

	Common American	R. G. American
Nos 10 to 16	₩ lb 3.15 @ 3.30c	4¼c
17 to 20	₩ lb 3.40 @ 3.60	4¼c
21 to 24	₩ lb 3.65 @ 3.90c	4¾c
25 to 26	₩ lb 4.00 @ 4.25c	5 c
27	₩ lb 4.25 @ 4.35c	5 c
28	₩ lb 4.40 @ 4.65c	5¼c
	B. B.	20 qual.
Galvanized, 10 to 20	₩ lb 7 c	6 c
Galvanized, 21 to 24	₩ lb 7¼c	6¼c
Galvanized, 25 to 26	₩ lb 8¼c	7 c
Galvanized, 27	₩ lb 9 c	7½c
Galvanized, 28	₩ lb 9½c	8 c
Patent Planished	A ₩ lb 10½c	B. 9½c
Russia	₩ lb	14c
American Cold Rolled B. B	₩ lb	7¼c

COPPER.—DUTY: Pig, Bar and Ingot, 4c; Old Copper 5c ₩ lb. Manufactured (including all articles of which Copper is a component or chief value), 35 % ad valorem.

American Ingot ₩ lb See Trade Report.

SHEATHING BRAZIERS COPPER, BOLTS, &C.

Brazier's Copper, ordinary sizes, 16 oz. per sq. ft., and over ₩ lb 26c

Braziers' Copper, ordinary sizes, under 16 oz. and over 13 oz., ₩ sq. ft. ₩ lb 28c

Braziers' Copper, 10 oz. and 12 oz., ₩ sq. ft. ₩ lb 30c

Braziers' Copper, Lighter than 10 oz. ₩ sq. ft. ₩ lb 32c

Circles less than 8 in. in diameter ₩ lb 28c

Circles 8 in. diameter and over ₩ lb 31c

Segment and Pattern Sheets ₩ lb 28c

Locomotive Fire Box Sheets ₩ lb 26c

Sheathing Copper, over 12 oz. ₩ sq. ft. ₩ lb 24c

Bolt Copper ₩ lb 26c

Copper Bottoms ₩ lb 31 @ 26c

No Copper is Sheathing except 14x48 inches, and not to exceed 14 oz. to the sq. ft.

TINNING.

Sheets 14 x 48 ₩ sheet 8c

All other size Sheets, 2½c ₩ sq. ft.

For tinning both sides, double the above amount.

O'NEILL'S PATENT PLANISHED COPPER.—Net.

14x48.

8 oz. and heavier ₩ lb 37c By the case ₩ lb 36c

Under 8 oz. and lighter ₩ lb 40c " ₩ lb 39c

Boiler Sizes.

7 in., 14x52. 8 in., 14x56. 9 in. 14x60.

4 and 16 oz. and heavier ₩ lb 30c By the case ₩ lb 38c

(And all sizes not over 20 in. wide.)

24x48&30x60.

14 and 16 oz. and heavier ₩ lb 41c

Under 8 oz. ₩ lb 44c

SHEATHING METAL.

Yellow Sheathing metal ₩ lb 20 @ 22c

BRASS.

Brown & Sharpe's Gauge the Standard for Metals. Old English Gauge the Standard for Wire.

BRASS MANUFACTURERS' PRICE LIST.—dis. 30 %. June 10. 1880.

Cash prices for Roll and Sheet Brass. For less quantities than 100 lbs add 3c. ₩ lb.

HIGH BRASS.

All Nos. not thinner than No. 28, wider than 2 in., not wider than 14 in. 30c

All Nos. to No. 28, inclusive, and widths over 14 to 20 in., inclusive 34c

All Nos. to No. 28, inclusive, and widths over 20 to 30 in., inclusive 38c

45c. ₩ lb advance on each No. above Nos. 28 to 36, inclusive.

All Brass thinner than No. 36 is Platers' Brass, at 45c. ₩ lb additional.

Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 in., in width wider than 2 in. 37c

Printers' Rules 45c

Sheets wider than 30 in. and under 40 in. 47c

" 40 in. and over 50c

Circular Sheets, in diam. from 4 in. to 14, inclusive 40c

" over 14 " 20, " 45c

" " 20 " 30, " 49c

" " 30 " 40, " 55c

" " 40 in. 59c

LOW BRASS.

Four cents ₩ lb more than High Brass

Gilding Metal, 8c ₩ lb more than High Brass.

Platers' or Gold Metal { In Bars 48c; Sawed 51c; Planed or Polished 54c

FOR SLITTING.

Metal, in width 1 in. to ⅛ in. to No. 28, inclusive, 1c ₩ lb advance.

Metal, in width 2 in. to 1 in thinner than No. 28, 2c ₩ lb advance.

Metal, in width 1 in. to ⅛ in. thinner than No. 28, 3c ₩ lb advance

Metal in width ⅛ in. to ¼, inclusive, not thinner than No. 28, 2c ₩ lb advance.

Metal in width ⅛ in. to ¼ thinner than No. 28, 5c ₩ lb advance.

Metal, ¼ in. in width and less, 10c ₩ lb advance.

Any of the above widths cut to particular lengths, add 7c ₩ lb.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire
4 per cent., 12 inch to No. 26	$0.52	$0.70
5 " " "	.56	.76
6 " " "	.64	.88
8 " " "	.74	1.03
8 " " "	.85	1 12

German Silver Sheets over 12 in. wide and weighing more than 10 lb., 8c ₩ lb.

Advance 2c. for each additional inch in width above 12 in. and 2c. ₩ lb on each No. thinner than Nos. 26 to 12, inclusive.

All German Silver thinner that No. 36 is Platers', at 40c. ₩ lb additional.

German Silver Scrap, one-half less than net price of 12 in. Market Metal. German Silver Turnings, Filings and Chips, half the price of Scrap.

BRASS AND COPPER WIRE.

	High Brass.	Low Brass.	Gild'g and Copper.
No. 0 to 20	$0.33	$0.37	$0.48
No. 21	.35	.40	.50
No. 22	.37	.41	.47
No. 23	.38	.43	.49
No. 24	.40	.44	.50
No. 25	.43	.47	.53
No. 26	.45	.49	.55
No. 27	.48	.53	.58
No. 28	.53	.58	.63
No. 29	.55	.59	.66
No. 30	.58	.62	.72
No. 31	.62	.66	.78
No. 32	.66	.70	.84
No. 33	.70	.74	.93
No. 34	.74	.78	1.03

Spring Wire 2c ₩ lb advance

Flat Square and Half-Round Wire 5c ₩ lb advance on Round Wire.

Fancy Wire not less than 10c ₩ lb advance on Round Wire.

Brass Rods, No. 8 and larger, not less than 2 feet lengths, 38c.

Wire straightened and cut smaller than No. 8 and not less than 2 feet lengths, 43c.

Wire and Rods less than 2 feet lengths, special rates.

Twelve cents per lb extra for spooling on 1 lb spools No 36.

MISCELLANEOUS.

Brass Pail Ears $0.50

Brass Door Rail .43

SCRAP.—Net.

High Brass Scrap 12c

Low Brass Scrap 10c

Gilding 10c

Turnings, Filings and Chips sell the price of Scrap.

Terms—Net cash. Interest to be added after thirty days.

TUBING.—dis. 30 %.

	₩ lb
Plain to No 20 inclusive above ¼ in. to 3 in	$0.42
Plain above 1 in	.43
Nos 21, 22, 23, two cents advance on List for each Number.	
Nos. 24, 25, 26, four cents advance on List for each Number.	
Above No. 26, special rates.	
Plain, ¼ inch	.78
Plain, 3-16 inch	1.10
Plain, ⅛ inch	1.90
All Mandrel Drawn Tubes, 5 cents advance on List	
Fancy Tubing to No. 20	52
English, Scotch and Extra Patterns Fancy Tubing to No. 20	55
Tubing Sawed or Cut 2 to 4 feet long, 2 cents advance on List	
Add two cents, ½ cent for each additional cutting under 2 feet.	
All Mandrel Drawn Tubes under 25 in. ¾c ₩ lb advance.	

ZINC TUBING—dis. 25 %.

Plain	27
Fancy	33
Scotch and Extra Patterns	36

GERMAN SILVER TUBING.—dis 25 %.

4 Per cent	.80
6 Per cent	.90
9 Per cent	1.00
12 Per cent	1 20
15 Per cent	1.35
16 Per cent	1.45
18 Per cent	1.50
20 Per cent	1.60

STEEL.—DUTY: Ingots, Bars, Sheets, &c., valued at 1c ₩ lb or less, 45 % ad val. Valued above 1c and not above 7c ₩ lb, 2c ₩ lb; valued above 7c and not above 10c ₩ lb, 2¾c ₩ lb; valued above 10c ₩ lb, 3¼c ₩ lb. *Extras.* Steel bars, rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, ¼c ₩ lb in addition to above. Steel Circular Saw Plates, 1c ₩ lb in addition to the above.

American Cast Steel.

For American Steel see quotations under heading of Pittsburgh.

English Steel.

Best Cast	₩ lb 15½c
Extra Cast	₩ lb 16½c
Circular Saw Plates	₩ lb 16c
Round Machinery, Cast	₩ lb 10c
Swaged, Cast	₩ lb 18c
Best Double Shear	₩ lb 14½
Blister, 1st quality	₩ lb 13c
German Steel, Best	₩ lb 11c
2d quality	₩ lb 10c
3d quality	₩ lb 9c
Sheet Cast Steel, 1st quality	₩ lb 15½c
2d quality	₩ lb 14½c
3d quality	₩ lb 12½c

ANTIMONY See Trade Report

LEAD.—DUTY: Pig, $2 ₩ 100 lb Old Lead, 2c ₩ lb

Pipe and Sheet, 3c ₩ lb.

American	4¾c @ 4¾c
Bar	6c
Pipe	6¾c, dis 10 %
Tin Lined Pipe	11c, dis 10 %
Sheet	7½c, dis 10 %
Shot	Drop 7c, Buck. 8c
Chilled Shot	8c

RABBITT METAL.

N. P. U.	₩ lb 8c
A. 28c; B. 25c; C. 15.	

TIN.—DUTY: Plates, Sheets, Tagger and Terne, 1c ₩ lb; Bars, Block and Pigs free.

Banca	₩ lb 23½c
Straits	₩ lb 22½c
English	₩ lb 23 0

TIN PLATE.

I C 10x14 } I C 14x20 } Prime Charcoal	$6.25 @ 6.75
Second quality	$5.87½ @ 6.25
I C 12x12 Prime Charcoal	6.50
I X 10x14 } I X 14x20 } Prime Charcoal	7.75 @ 8.00
Second quality	$7.25 @ 7.40
I X 12x12, Prime Charcoal	8.25
D C 12½x17, Prime Charcoal	5.75
D X 12½x17, Prime Charcoal	7.25
For each additional X add	1.50

COKE TIN PLATE.

	Best.	Ordinary.
I C 10x14 } I C 14x20 }	$4.50	$4.15 @ 5.40
I C 12x12	5.75	5.40 @ 5.50

TERNE PLATE.

	Prime Char.	2d Qual.	Coke.
I C 14x20	$5.40 @ 6.25	5.25	5.12½
I X 14x20	7.25 @ 7.50	....	....
I C 20x28	11.00 @ 11.25	10.50 @ 10.75	10.00 @ 10.25
I X 20x28	14.50 @ 15.00	....	....
I C 20x200	13.50	....	....
I C 14x20 M. F. Brand			$7.75

SOLDER—¼ & ½ 15c

Extra .13½c

No. 1 .13 c

SPELTER.—DUTY: in Pigs, Bars and Plates, $1.50 ₩ 100 lb.

American, cash	5.00 @ 5.25
ZINC.—DUTY: Pig or Block, $1.50 ₩ 100 lb; Sheet 2½c ₩ lb.	
Sheet, Cask	6½ @ 6¾c
Sheet, Open	6¾ @ 7c

Paper Stock, &c.

(*Dealers Selling Prices.*)

	Cents ₩ lb.
White Shirt Cuttings No. 1	7 @ 7
White Shirt Cuttings, No. 2	6¼ @ 6
Mill Assorted Whites	5¼ @ 5¼
Unbleached Muslins	6½ @ 6¾
City Whites, No. 1	4½ @ 4¾
New Canton Flannels	@ 0¾
New Seconds, light	3¼ @ 3¼
New Seconds dark	2¾ @ 3
No. 2 Whites	2½ @ 2¾
Cotton Canvas	4½ @ 4¾
Linen Canvas, No. 1	4½ @ 4¾
Seconds, City No. 1	1¾ @ 1¾
Seconds, City No. 2	1 @ 1¼
Colors, per cwt.	70 @ 90
Manila Rope	@ 3
Manila Rope, Tarred	2½ @ 2¾
Gunny Bagging, No. 1	1¾ @ 2
Gunny Bagging, No. 2	1½ @ 1¾
Kentucky Bagging	4 @ 4¼
Burlap Bagging, No. 1	2¼ @ 2¾
Tar Shakings	2 @ 2¾
Hemp Twine Stock	4¾ @ 5
Hard White Shavings, No. 1	4 @ 4¾
Soft White Shavings, No. 1	3¼ @ 3¾
White Shavings, No. 2, soft	3 @ 3
Mixed shavings, part white	2½ @ 3
Ledger and Writing	3 @ 3¼
Solid Stock	2½ @ 2¾
Book Stock, No. 1, light	1¾ @ 1¾
Old Newspapers	1¼ @ 1¼
Pure Manilas	1¾ @ 2
Bogus Manilas and Hardwares	¾ @ 1
Commons per 100 lbs	60 @ 70
Binders' Board Cuttings	⅞ @ 1
Straw Board Cuttings per cwt	70 @ 75

Paints, Oils, &c.

Paints.

Black Lamp, Coach Painters	₩ lb 22 @ 24
Black Lamp, Ordinary	₩ lb 0c
Black Ivory Drop, fair	12 @ 15c
Black Ivory Drop, best	20c
Black Paint, in oil	kegs 8c; asst'd cans, 11c
Blue Prussian, fair to best	40 @ 55c
Blue Prussian, fair to best, in oil	45 @ 55c
Blue Chinese dry	70c
Blue Ultramarine	18 @ 20c
Brown, Spanish	1½c
Brown, Van Dyke	10 @ 12c
Green, Chrome	15 @ 25c
Green, Chrome, in oil	14 @ 18 @ 25c
Green, Paris	good, 20c; best, 25c
Green, Paris, in oil	good, 30c; best, 45c
Iron Paint, Bright Red	₩ lb 2½c
Iron Paint, Brown	₩ lb 1½c
Iron Paint, Purple	₩ lb 2 c
Iron Paint, Ground in oil, Bright Red	₩ lb 5½c
Iron Paint, Ground in oil, Red	₩ lb 5½c
Iron Paint, Ground in oil, Brown	₩ lb 5½c
Iron Paint, Ground in oil, Purple	₩ lb 6 c
Mineral Paints	2 @ 4c
Orange Mineral	10c
Red Lead, American	7c
Red Venetian (Eng.) dry	$1.65 @ $1.75
Red Venetian, in oil	asst'd cans, 11c; kegs, 8c
Red Indian dry	9 @ 12c
Rose Pink	10 @ 13c
Sienna, American, Raw, powdered	4c
Sienna, Burnt, powdered	4½c
Sienna, Burnt, in oil	10 @ 15 @ 20c
Sienna, Raw	11 @ 15 @ 25c
Umber, Burnt, powdered	4 @ 8c
Umber, Burnt, in oil	9 @ 12 @ 15c
Umber Raw, powdered	3½ @ 7½c
Umber, Raw, in oil	10 @ 15 @ 45c
Vermillion, Chinese	90c
Vermillion, English	40 @ 45c
Vermillion American, Common	15c
White Lead, American, pure dry	6½ @ 6¾c
White Lead, American, pure in oil	6½ @ 7c
White, Paris, English, prime	in bbls. 2 @ 2½c
Yellow Ochre, French	$1.75
Yellow Ochre, French, in oil	asst'd cans, 11c; kegs, 8c
Yellow Ochre, Vermont	in casks, 1½c
Yellow Chrome	17 @ 27c
Yellow Chrome, in oil	14 @ 18 @ 25c
Zinc White, American No. 1, dry	5 @ 6c
Zinc White, American No. 1, in oil	9c
Zinc White, French (Paris) dry	8 @ 10c
Zinc White, French, in oil	10 @ 11c

Oils.

Linseed Raw, in casks and bbls	56 @ 57c
Linseed Boiled, in casks and bbls	59 @ 60c
Linseed, Calcutta	58 @ 59c
Bleached White	₩ gal. 95c
Bleached Sperm	₩ gal. $1.22
Bleached Elephant	72c
Signal	75c
Prime Lard	60c
No. 1 Extra	52c
West Virginia	120 @ 180
Drilling	45c
Miners' Oil	40c @ 42c
Fish Oil, pressed	42c @ 45c
Neatsfoot	70c @ 80c
Tallow	70c @ 74c
Empire Cylinder Oil	64c
Machinery	42c
Engine	40c

Sundries.

Asphaltum Cuban	6½c @ 9½c
Asphaltum Egyptian	9c @ 10c
Benzine	₩ gal. 8c @ 10c
Chalk	45c
Chalk, Block	75c
Dryers Patent Am'n	asst. cans, 9c; kegs 7c
Frostings	6
Glue, White	21 @ 25c
Glue, Sheet	20c
Glaziers' Points, Zinc	8c
Gum, Copal	35c
Gum, Damar	25c
Gum Shellac, English	40c
Gum Shellac, English, dark	35c
Litharge	7½c
Mineral Wool, ordinary	₩ lb 1 @ 1½c
Mineral Wool, extra	₩ lb 3 @ 3½c
Pumice Stone, selected Lumps	4 @ 6c
Pumice Stone, Powdered	2½c
Pine Tar, bbls	$2.75
Pitch	$1.90
Putty, in bladders	7c
Putty, in bulk	2½c
Rosin—Common and Good—Strained	$1.90
E & F	$2.10 @ $2.20
G & H	$2.30 @ $2.50
I & K	$2.60 @ $2.80
M & N	$3.00 @ $3.25
Spirits Turpentine	42 @ 43c
Whiting Spanish	3c
Waste, No. 1 Cop	10c
Waste, No. 1 White Machine	1c
Waste, No. 2 White Machine	9½c
Waste, No. 1 Colored	7c
Waste, No. 2 Colored	6½c
Waste Washed Machine	c

Glass.

Prices current per box of 50 feet.
List, July 2, 1883.

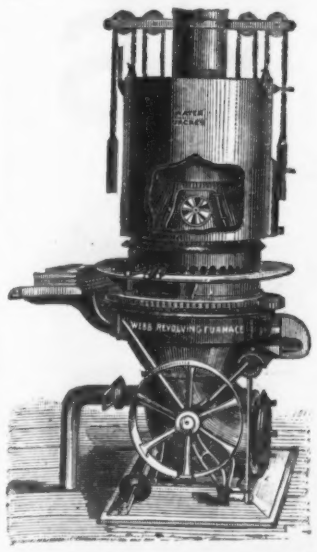
Single.

SIZES.	1st.	2d.	3d.	4th.
6 x 8 to 10 x 15	$13.50	$11.50	$10.75	$10.25
11 x 14 to 16 x 24	14.50	13.50	12.50	11.50
18 x 22 to 20 x 30	18.50	17.00	15.50	14.00
15 x 36 to 24 x 30	20.50	18.50	16 25	
26 x 28 to 24 x 36	22.00	20.50	17 50	
26 x 36 to 26 x 44	24.00	22.00	18.50	
26 x 46 to 30 x 50	26 00	24 00	20.50	
30 x 52 to 30 x 54	27.00	25.00	21.50	
30 x 56 to 34 x 56	29.00	27.00	24.00	
34 x 58 to 34 x 60	31.00	29.00	26.00	
36 x 60 to 40 x 60	35.00	31.00	29.00	

Double.

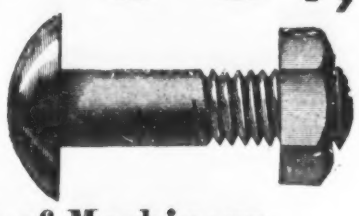
SIZES.	1st.	2d.	3d.	4th.
6 x 8 to 10 x 15	$17.50	$15.00	$14.00	$13.00
11 x 14 to 16 x 24	20.00	18.00	16.50	
18 x 22 to 20 x 30	24.00	22 00	20 00	
15 x 36 to 24 x 30	26.50	24 00	21.00	
26 x 28 to 24 x 36	29.00	26 00	23.00	
26 x 36 to 26 x 44	30 00	28.00	24.00	
26 x 46 to 30 x 50	33.00	31.00	27.00	
30 x 52 to 30 x 54	35 00	32.00	28.00	
30 x 56 to 34 x 56	37.00	34.00	30 00	
34 x 58 to 34 x 60	40.00	37.00	33.00	
36 x 60 to 40 x 60	43 00	40.00	37.00	

Sizes above—$15 per box extra for every 5 inch 8. An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 inches, will be charged in the united 81 inches bracket Discount, 25 and 5.



PAWTUCKET MFG. CO.,

PAWTUCKET, R. I.,



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COLD-PUNCHED, SQUARE AND HEXAGON NUTS, WASHERS, &c.

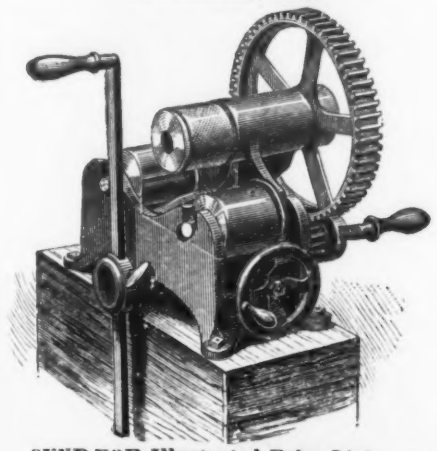
PUNCHED CHAIN LINKS, STIRRUPS, LEVERS, and all kinds of COLD PUNCHING

RODS, BOLTS AND IRON FOR BUILDINGS.

Webb's Revolving Forge Furnaces.

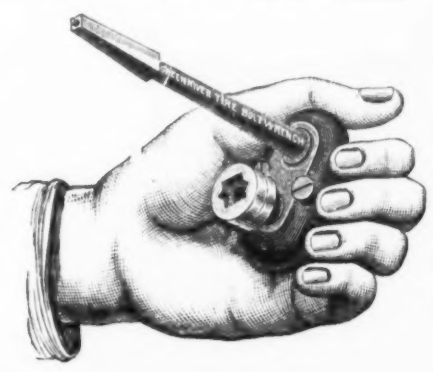
WILEY & RUSSELL MFG. CO.,
Greenfield, Mass.

LIGHTNING SCREW-CUTTING MACHINERY and GREEN RIVER TOOLS.



GREEN RIVER PATENT RIM WRENCH

For Nuts on Tire Bolts Inside the Felloe.



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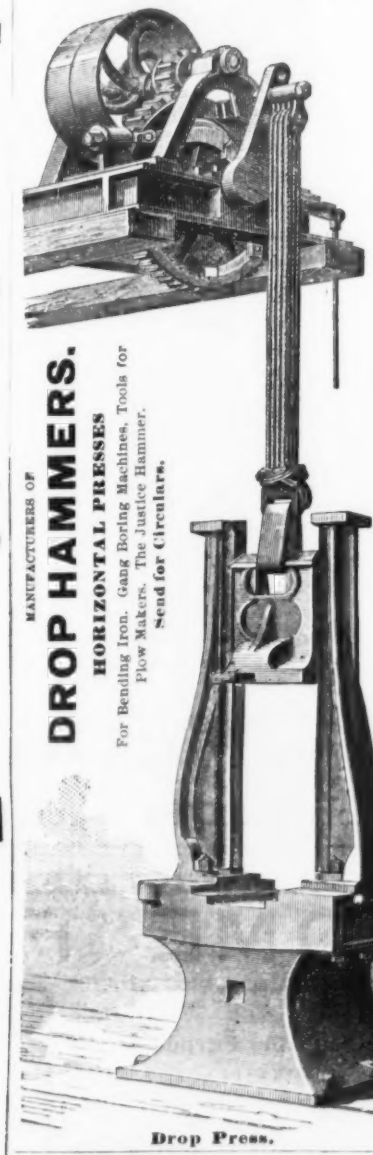
Agents in London, England, Messrs. SELIG, SONNENTHAL & CO.

WILLIAMS, WHITE & CO.,
MOLINE, ILLINOIS.



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HORIZONTAL PRESSES
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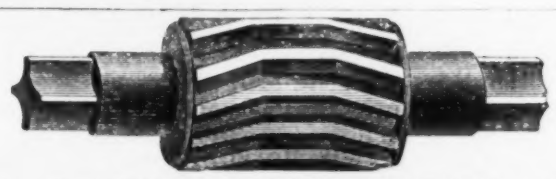
Send for Circulars.

Drop Press.



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FOR ROLLING MILLS.

THE BEST. Send for Circular and Prices.

CHILLED AND SAND ROLLS,
Rolling Mill Machinery,

Rail, Merchant and Rod Mills for Iron or Steel; Brass and Copper Mills with all Special Machinery.

SHEARS,

Vertical or Horrizontal, with or without Engines, in sizes to cut four-inch square to Hoop Iron.

Hydraulic Presses, Pumps and Accumulators,

POWER SCREW AND DROP PRESSES, SQUEEZERS, ROLL LATHES, IRON CRANES, ORE CRUSHERS, ETC.,

RUBBER-WORKING MACHINERY,

Iron and Brass Castings, Shafting and Gearing.

BIRMINGHAM IRON FOUNDRY,

ESTABLISHED 1836. BIRMINGHAM, CONN.

THE BOLTON STEEL CO.,

MANUFACTURERS OF

THE BEST REFINED

TOOL STEEL

AND OTHER FINE GRADES OF

CAST STEEL.

CANTON STEEL WORKS,

CANTON, OHIO.

PERFORATED SHEET METALS

For Elevators, Malt Kiln Floors, Grain Dryers, Threshers, Separators, Corn Shellers and all kinds of Grain Cleaning Machinery; also for Mining and Concentrating Works, Coal, Coke and Ore Screens, Gas and Water Works, Paper, Woolen, Flour and Oil Mills, Filters, Strainers, Ventilators, etc. PERFORATED TIN AND BRASS of all sizes. Special attention given to work for Railroads and Car Builders. **Iron, Steel, Copper, Brass and Zinc Punched to any size and thickness required.** Correspondence solicited.

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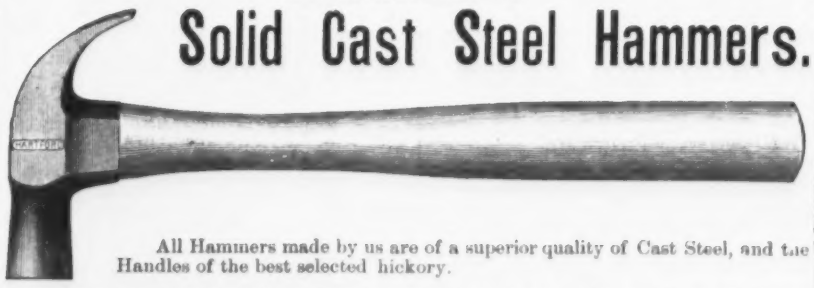
Branch Office, 100 Beekman St., New York.

THE
HARTFORD HAMMER CO.,

HARTFORD, CONN., U. S. A.,

MANUFACTURERS OF

Solid Cast Steel Hammers.



All Hammers made by us are of a superior quality of Cast Steel, and the Handles of the best selected hickory.

Desiring to put the best Hammer on the market, each one is thoroughly tested before leaving the factory, and those stamped "HARTFORD" are warranted.

WE WOULD CALL SPECIAL ATTENTION TO OUR

ADZE-EYE BALL PENE,

being the only Machinist Hammer with an elongated socket, which socket gives greater bearing to the handle than the ordinary trade hammer, and improves the appearance as well as to its great advantage.

Having lately added to our machinery, we can fill orders promptly, and invite inquiries for discounts.

The Standard Sifter of the World

Over 3,000,000 In Daily Use.

Every Sifter carefully inspected before being packed and shipped.

Special price to the trade.

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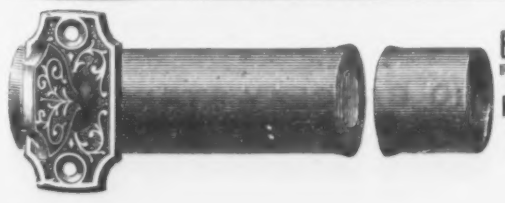

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Burglar-Proof Door Bolts.

For sale by leading Hardware Jobbers throughout the country.

HOBART B. IVES,

Sole Manufacturer and Patentee,
187 St. John Street,
NEW HAVEN, CONN., U. S. A.
Send for Illustrated Price List.

BAEDER, ADAMSON & CO.,

Manufacturers of SAND & EMERY PAPER & EMERY CLOTH.

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Ground Emery, Corundum & Flint, Glue & Curled Hair, Hair Felt, & Felting for Covering Boilers, Pipes, &c., Cow Hide Whips.

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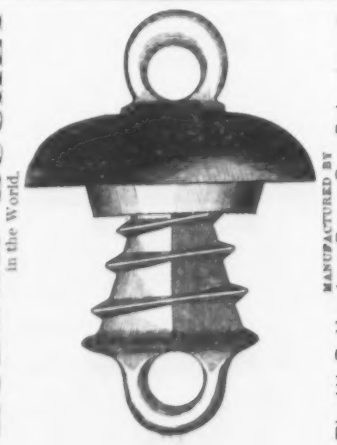
The Simplest, Most Durable and Easily Expanded
RUBBER BUCKET
in the World.



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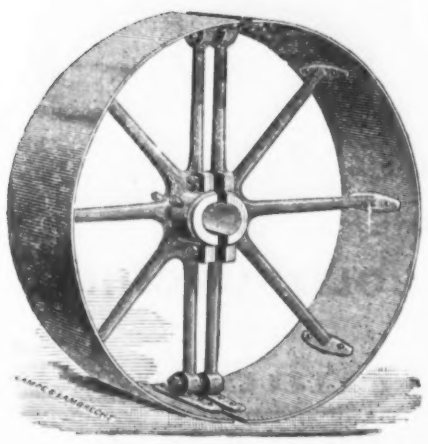
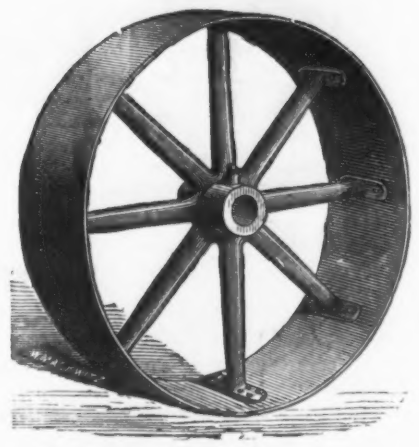
PERFECT PULLEYS.



THE MEDART PATENT
WROUGHT RIM PULLEYS.



(Patented in the United States, England, France, Germany, Canada and Belgium)

THE LIGHTEST, STRONGEST, BEST BALANCED AND CHEAPEST IN THE WORLD.

In the market for four years, and over 150,000 now in use.

The following testimonials from some of the most prominent firms using our pulleys furnish proof of their excellent qualities:

We, the undersigned, are using in our works a number of Medart's Patent Wrought-Rim Pulleys, and regard them GREATLY SUPERIOR to all Cast Pulleys in Lightness, Strength and Balance.

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Meader Furniture Co., " "
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L. Schreiber & Sons, " "
H. Closterman, " "
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Dueber Watch Case Mfg. Co., Newport, Ky.
Kentucky Malting Co., Louisville, Ky.
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Hershey Lumber Co., Muscatine, Iowa.
Bloomington Furniture Mfg. Co., Bloomington, Ill.
Henry C. Yaeger, Mill, Kane, Ill.
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St. Louis and San Francisco R. R. Co., St. Louis, Mo.
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St. Louis Woodenware Works, " "
Whitman Agricultural Co., " "
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Our Pulleys are from 40 to 60 per cent. lighter than all cast pulleys, but, notwithstanding their lightness, WE WARRANT them for ANY STRAIN, from the LIGHTEST to the HEAVIEST. Whole Pulleys from 9 inches to 96 inches diameter, and Split Pulleys from 12 inches to 72 inches diameter; all widths of face up to 32 inches crowning and 36 inches straight; also tight-and-loose and double arms. Absolute satisfaction guaranteed.

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Factory and Office: Nos. 1206 to 1214 North Main St., ST. LOUIS, MO. Branch Store: 130 W. 2d St., CINCINNATI.

HENDERSON'S
DOME FURNACE.

The Dome is cast in one piece and has no joints. It is the best and cheapest Furnace made.

This Portable Furnace

IS MADE TO BE

TIGHT without CEMENT,

and is easily put up for use, and can be set in any kind of place; being made of

ALL CAST IRON,

It is not liable to get out of repair or leak gas.

THE FIRE-POT & GRATE ARE LARGE,

which insures its working every time with LITTLE TROUBLE OR CARE. The Grates are made plain or clinkerless, as most desirable. The radiating surfaces being large, makes it a very

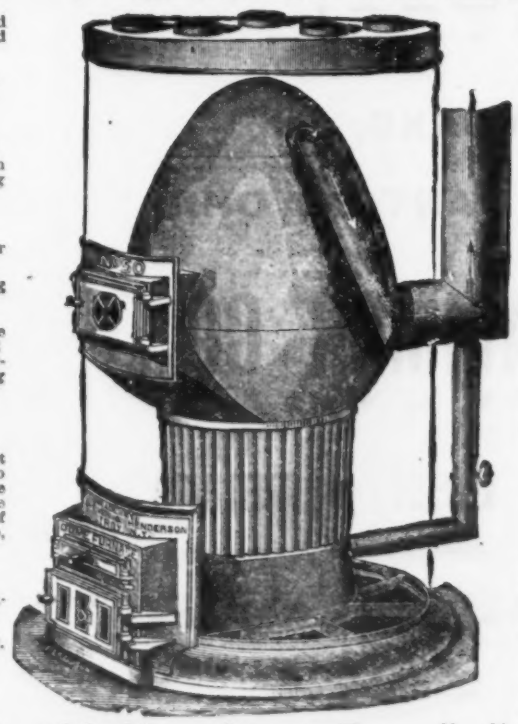
POWERFUL HEATER.

They have a check draft and dust damper attached to the ash-pit, to better regulate them. They are the cheapest first-class furnace on the market. They will beat any kind of building, either public or private, economically and well.

Four Sizes are Made,

and can be set in either brick or portable form.

No. 40, No. 50, No. 60, No. 70.



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J. C. HENDERSON, 193 River Street, Troy, N. Y.

Send for Price List and References, if needed.

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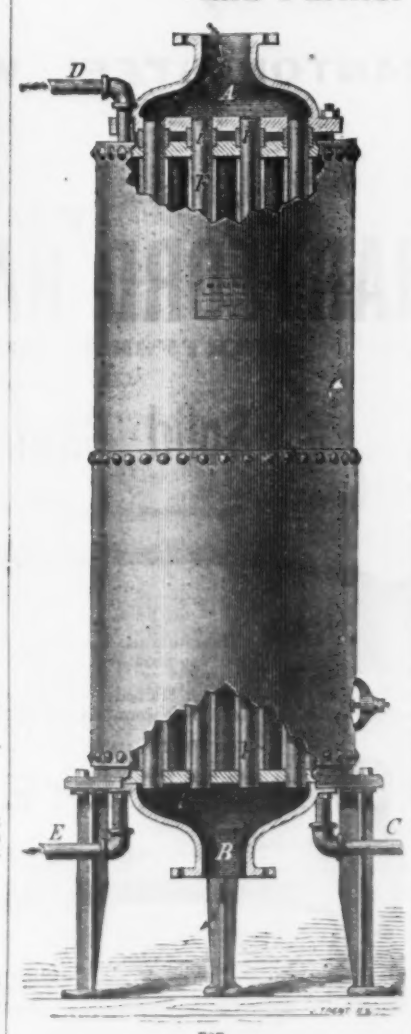
Feed Water Heater and Purifier



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Heating and Purifying Water for Steam Boilers.

Patented July 12, 1877.

HAS STRAIGHT TUBES.

Simplicity, Reliability and Efficiency, at Less Cost than any Other

Write for prices and further information to he manufacturers,

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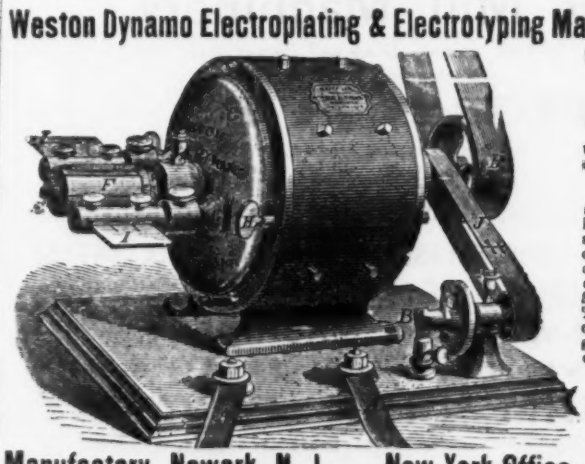


For Nickel, Bronze, Brass, Copper and Silver Plating.

Over 1000 machines in use. Are used by all leading stove manufacturers.

Experienced men sent to put up machines and instruct purchasers.

INFRINGEMENTS.

We call attention to infringements of the Weston Machine in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

MANUFACTURERS OF

Cast Nickel Anodes, Pure Nickel Salts, Polishing Materials.

Manufactory, Newark, N. J. New York Office, 92 & 94 Liberty St.

G. A. CROSBY & CO.,

259 & 261 Randolph St.,

CHICAGO, ILL.,

Manufacturers of all kinds of

Power, Screw, Hand, Foot and Drop

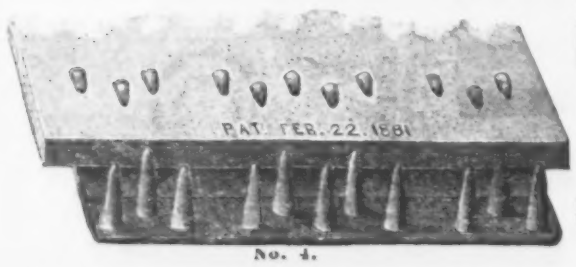
PRESSES,

DIES,

And Special Tools for Tin Can Makers and Sheet Metal Workers.

Send for Catalogue and Price List.

A WORLD BEATER,



No. 4.

Because there is no other Belt Fastener on earth that can hold a candle alongside of it. It is

CHEAPER,
STRONGER,
MORE DURABLE,
EASIER ADJUSTED

than any other Belt Fastener made. It makes a

CONTINUOUS BELT.

THACHER'S PATENT BELT FASTENER.

ONCE USED, ALWAYS USED.

It's a running Advertisement of Itself. A Sample by Mail Free.

THACHER & CO., Cleveland, O.

NEWELL'S

UNIVERSAL MILL.

Pulverizes everything—hard, soft, sticky, and gummy. Grain, Drugs, Chemicals, Clay, Guano, Cotton Seed, Bark, &c., &c. A wonderful machine for grinding Corn, Oats, Feed, &c. Also Steam Engines, Boilers, &c., at lowest rates. Send for circular.

10 BARCLAY STREET,

NEW YORK.

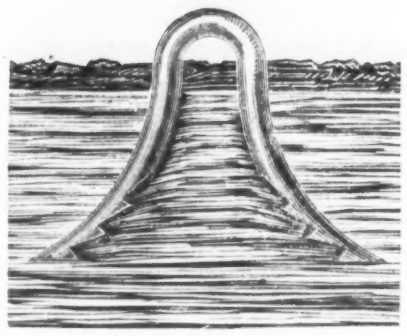
FROST'S PATENT SELF-CLINCHING STAPLES.

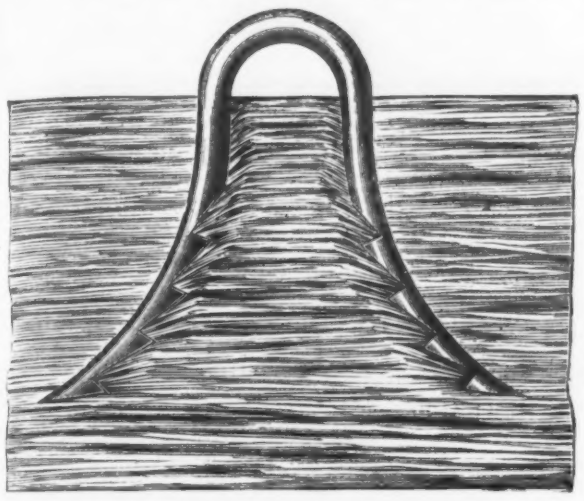
This STAPLE **clinches itself,** and has MANY TIMES the holding power of any other Staple in the market.

This STAPLE requires no boring to insert it, NEVER splits the wood, and can be driven in all kinds of wood.

This STAPLE enters the wood at an angle, has a chisel cut on the outside, presses the wood down on the inner side, which enters the notches (as shown), which prevents withdrawal. Only one Staple of this kind is required, where, of the common kind, two or more have to be used.

This is the ONLY STAPLE, when driven into Green Wood, that, when the wood dries and shrinks, holds equally well. Impossible to get loose and fall out, as in other staples. Perfect Staple for BARB WIRE FENCES, giving ABSOLUTE SECURITY from withdrawal.





GUARANTY.

We guarantee our Staple to do as represented. We warrant them. **We take all the risk, you take none.** The Self-Clinching Staples are made in two sizes and lengths.

No. 7, Steel Galvanized Wire, 2¼ in. long, extra heavy and strong, used where an unusual strain is required.

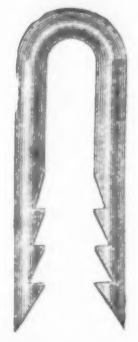
No. 9, Steel Galvanized Wire, 1¾ in. long, perfectly adapted for Barbed Wire Fencing.

FOR SALE BY

STILES FROST,

276 Devonshire St., Boston, Mass., U. S. A.

SEND FOR CIRCULARS, PRICES AND SAMPLES.



WARD & PAYNE,

MANUFACTURERS OF

EDGE TOOLS, SOLID CAST-STEEL MACHINE AND HAND-MADE SHEEP SHEARS.

Proprietors of the Celebrated Brand S. J. ADDIS, LONDON, Carving Tools.

Being by far the largest producers in the world of the above goods, Ward & Payne are enabled to quote prices which distance competition.

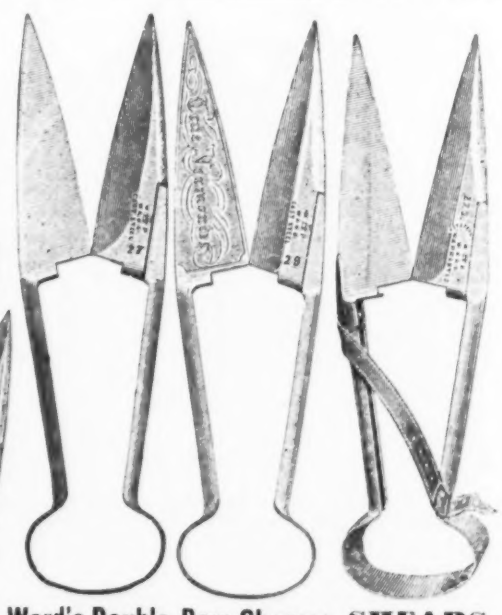
Orders booked from 1st of July for delivery as required.

The reputation Ward & Payne have long enjoyed for their Sheep Shears and other goods in Australia, the Continent of Europe, California, &c., is a guarantee of the excellence of their manufacture.

Two to Three Dollars per dozen difference in favor of purchaser of their justly approved Sheep Shears over all other brands.

One Trial Convinces and secures the account.

SHEFFIELD, ENGLAND.



Corey's Patent Equalizing Spring.

The best idea ever invented for giving ease to the shearer, regulating the pressure from 4¼ to 10 pounds at will. Can be attached to all shears.

Ward's Double Bow Shears are in general use in Australia, and are there pronounced "the grandest shears ever put into wool."

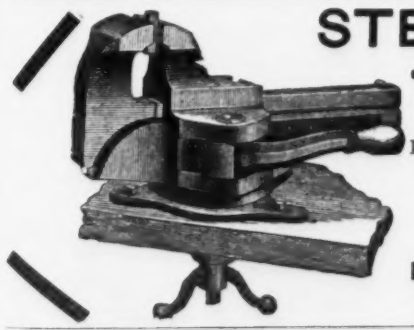
SHEARS Prov ded with Straps assist the shearer materially.

BEST CAST TRADE U.S. MARK. TOOL STEEL BROWN & CO.,

BROWN.

PITTSBURGH, PA.

STEPHENS' VISE.



Every Mechanic using this Vise saves one-half his time and labor.

For Sale by the Trade.

NATHAN STEPHENS,

Office, 41 Dey St, New York.

J. E. REDFIELD,

MANUFACTURER OF

TAPS, REAMERS, SCREW PLATES, &c.

ESSEX, CONN.

Our Taps are all Machine Relieved, and we guarantee them to give satisfaction.

No. 1 Carries 7 feet earth.
No. 2 Carries 5 feet earth.
No. 3 Carries 3½ feet earth.

PATENTED December

The York Pat. Steel Scraper

The Lightest and Strongest Scraper made. The body is made of one single piece of steel. *The Handles are fastened inside of fold, and free from all obstructions.* The body, ball and runners are all made of steel. Especially suited for contractors. Send for circulars. Manufactured by

THE YORK MFG. CO. Limited Portsmouth, Ohio.

STEEL COLD ROLLED. SEND FOR CIRCULAR. **B. F. BELLOWS,** 145 Seneca St., CLEVELAND, O. FIGURES and ALPHABETS.

GRAIN SCOOPS,

MANUFACTURED BY

HUSSEY, BINNS & CO.,

PITTSBURGH, PA., U. S. A.

NEW YORK AGENCY:

DURRIE & McCARTY,

97 CHAMBERS STREET.

Self-Binders for The Iron Age

We are now prepared to supply our subscribers with an excellent self-binder for their papers, a cut of which is annexed. We call attention to the low prices at which it is offered. Addres, all orders to

DAVID WILLIAMS,
83 Reade street, New York.

SANDS' TRIPLE MOTION WHITE MOUNTAIN ICE CREAM FREEZERS.

THE WHITE MOUNTAIN FREEZER COMPANY are headquarters for Ice Cream Freezers and Ice Crushers, being the only firm in the United States who manufacture all parts of the raw material. The Examining Committee, consisting of 50,000 Citizens of the United States, have recommended the *Sands' Triple Motion White Mountain Freezer* to all persons in the world, for the following reasons: We have used them; they freeze quicker than any other; they save time, salt and ice; the triple motion makes smooth cream without bunches; makes more of it; galvanized iron outside; tin inside; no zinc in contact with the cream; easily adjusted; substantially made; simple in construction; perfect in results. Send for descriptive circular and discount of this celebrated Freezer.

Address,

HAND FREEZER. 2 to 25 qts. $3.75 to $25.00.

HAND OR POWER. 24 and 50 qts. $75.00 and $175.00

HAND OR POWER ICE CRUSHER. $75.00

White Mountain Freezer Co.
Nashua, N. H., U. S. A.

SPECIAL ATTENTION GIVEN TO EXPORT ORDERS.

DROP FORGED.

MERRILL BROS., 26 First St., Brooklyn, E. D., N. Y.

New York Wholesale Prices, September 5, 1883.

(For Wholesale Metal Prices See Page 38.)

HARDWARE.

Anvils.
Eagle Anvils American. ...... ₩ lb 10c—dis 20 %
Wright's......................11c @ 11½c
Armitage's Mouse Hole..........9½c @ 9¾c
Armitage's Mouse Hole (extra quality)..........11½
Trenton..........10½c
Wilkinson's..........10½c

Anvil Vise and Drill.
Millers Falls Co., $18.00..........dis 20 %
Cheney Anvil and Vise..........dis 33⅓ %

Augers and Bits.
Conn. Valley Mfg. Co. / Douglass Mfg. Co. / C. E. Jennings & Co. / Humphreysville Mfg. Co. / Ives / Beecher (French, Swift & Co. / Griswold / Nobles Mfg. Co. / Snell Mfg. — dis 50@55 % from list of Jan. 7, 1880.
Watrous & Co. Extension Lip..........dis 35 %
Cook's Douglass Mfg. Co..........dis 40&10 %
Patent Solid Head..........dis 30 %
Lewis' Patent Single Twist..........dis 45 %
Russell Jennings' Auger, Dowel, Machine-Dowel and Hand Rail Bits..........dis 10&10&10 %
Russell Jennings' Augers..........dis 16⅔&10&10&10 %
Russell Jennings' Car and Machine Bits, Boring-Machine and Millwrights' Augers......dis 25&10&10&10 %
Imitation Jennings' Bits..........dis 50 %
Ives' "Jennings" Bits..........dis 40&10 %
Snell Mfg. Co.'s Jennings' Bits..........dis 40 %
Expansive Bits, Clark's, small, $18; large, $26..dis 25 %
Expansive Bits, Ives'..........$20@$30—dis 33⅓&10 %
Expansive Bits, Blake's..........$20—dis 40 %
Expansive Bits, Derby, $17 and $26..........dis 40 %
Hollow Augers, Ives / Hollow Augers, French, Swift & Co. — dis 25 %
Hollow Augers, Douglass'..........25 %
Hollow Augers, Bonney's Adjust. ₩ dz. $48—dis 25&10 %
Hollow Augers, Stearns' Adjust. ₩ dz. $48—dis 20&10 %
Hollow Augers, Ives' Expansive, each $4.50—dis 30&10 %
Hollow Augers, Universal Expan., each $4.50—dis 20 %
Wood's..........dis 25 %
Gimlet Bits..........$7.50 ₩ gross, dis 50 %
Gimlet Bits, Diamond..........₩ doz. $1.10, dis 25&10 %
Gimlet Bits "Bee"..........dis 25 %
Double Cut Gimlet Bits, Shepardson's..........dis 45 %
Double Cut Gimlet Bits, Ct. Valley Mfg. Co. dis 20&10 %
Double Cut Gimlet Bits, Hartwell's..........dis 60 %
Double Cut Gimlet Bits, Douglass'..........dis 40 %
Double Cut Gimlet Bits, Ives'..........dis 50 %
Morse's Bit Stock Drill..........dis 25&10 %
Holtz Bit Stock Drills..........dis 25&10 %
L'Hommedieu's Ship Augers..........dis 15 %

Awl Hafts.
Sewing, Brass Ferrule ......$3.50 ₩ gross—dis 40&10 %
Patent Sewing, Short..........$1 00 ₩ doz.—dis 40&10 %
Patent Sewing, Long..........$1.20 ₩ doz.—net
Patent Peg, Plain Top..........$10.00 ₩ gross—dis 40&10 %
Patent Peg, Leather Top ... $12.00 ₩ gross—dis 40&10 %

Awls, Brad Sets, &c.
Awls, Sewing, Common ..... ₩ gross $1.70—dis 25&10 %
Awls, Shouldered Peg..........₩ gross $2.45—dis 25&10 %
Awls, Patent Peg..........₩ gross 63c—dis 25&10 %
Awls, Shouldered Brad..........₩ gross $2 70—dis 25&10 %
Awls, Handled Brad..........$7.50 ₩ gross—dis 25&10 %
Awls, Handled Scratch..........$7.50 ₩ gross—dis 25&10 %
Awls, Socket Scratch..........$1.50 ₩ gross—dis 10&10 %
Brad Sets, Aiken's..........₩ doz $10.00—dis 50&10 %
Millers Falls Adj. Tool Hdles... ₩ doz $12—dis 25 %
Brad Sets, No. 42, $10.50; No. 43, $12.50....dis 70&10&5 %
Brad Sets, Stanley's Excelsior, No. 1, $9.60...dis 30&10 %
Brad Sets, Stanley's Excelsior, No. 2, $1.80.. dis 30&10 %
Brad Sets, Stanley's Excelsior, No. 3, $7.80...dis 30&10 %

Axes.
Single Bit, 4½ to 5½ and under..........₩ doz 8.00 net
Single Bit, 4½ to 6 and over..........₩ doz $8.50 net
Single Bit, beveled..........50c ₩ doz advance
Double Bit, 4½ to 5½ and under..........₩ doz $15.00 net
Double Bit, 4½ to 6 and over..........₩ doz $16.00 net
Double Bit, beveled..........$1.00 ₩ doz advance

Axle Grease.
Frazer's..........₩ lb 6c

Axles.
Standard list..........dis 45 %

Balances.
Spring Balances..........dis 33⅓ %

Bells.
Hand, Light Brass..........dis 70 %
Hand, Extra Heavy..........dis 45 %
Hand, White Metal..........dis 60 %
Hand, Silver Chime..........dis 20&10 %
Hand, Globe (Cone's Patent)..........dis 25&10 %
Gong, Abbe's..........dis 20&10 %
Gong, Yankee..........dis 30&10 %
Gong, Barton's..........dis 30&10 %
Crank, Taylor's..........dis 25&10 %
Crank, Brooks'..........dis 50&10&2 %
Crank, Cone's..........dis 10 %
Crank, Connel's..........dis 15&10 %
Lever, Sargent's..........dis 55&10 %
Lever, Taylor's Bronzed or Plated..........net
Lever, Taylor's Japanned..........dis 25&10 %
Lever, R. & E. M. Co.'s..........dis 50&10&2 %
Lever, Reading..........dis 25&10&10&2 %
Pull, Brook's..........dis 50&10&2 %
Pull, Western..........dis 25&10 %
Call..........dis 25 %
Cow, Common Wrought..........dis 55&10 %
Cow, Western..........dis 20&10 %
Cow, Western, Sargent's new list..........dis 60&10&10 %
Cow, Kentucky "Star"..........dis 20&10 %
Cow, Kentucky Sargent's new list..........dis 60&10&10 %
Cow, Dodge' Genuine Kentucky, new list—

Nos.	0	1	1½	2	3	4	5	6	Hog	
	$12.00	10.0	9.0	8.00	7.00	5.00	3.50	2.50	5.00	dis 60 %

Cow, Texas Star..........dis 40&10 %

Bellows.
Blacksmiths Common..........dis 45 %
Blacksmiths' Extra Pittsburgh Pattern..........dis 20 %
Molders'..........dis 25 %
Hand Bellows..........dis 20 %

Belting, Rubber.
Belting and Packing Co..........dis 50 %

Bit Holders.
Extension, Barber's..........₩ doz $15.00—dis 40&5 %
Extension, Ives'..........₩ doz $15.00—dis 40 %
Diagonal..........₩ doz $24.00—dis 40 %
Angular..........₩ doz $24.00—dis 40&5 %

Blind Adjusters.—Domestic..₩ doz $3.00—dis 30 %
Excelsior..........₩ doz $16.00—dis 50&10&2 %

Blind Fasteners.
Mackrell's..........₩ doz pairs, $1.00 dis 20&10 %
Van Sand's Screw Pattern..........$9 ₩ gro. dis 10&2 %
Van Sand's Old Pattern..........$9 ₩ gro. dis 10&2 %
Washburn's Old Pattern..........$9 ₩ gro. net
Merriman's..........new list, net
Salisbury & Austin, No. 2008..........$9 per gro. net
Security Gravity..........$9 per gross, net

Blind Staples.
Bar bed, ½ in. and larger..........₩ lb 9¾c net
Bar bed ⅜ in..........₩ lb 11½c net

Blocks.
Penfield Block Co., I. R. and I. Strap'd.... New List dis 40 %
Penfield Block Co., W. I. C. bushed.... dis 40 %
Penfield Block Co., W. I. all steel roll'r.. dis 20 %
Penfield Block Co., L. & I Sheaves.... dis 40 %
Stanley Rule & Level Co.'s..........dis 40&10 %

Bolts.
Cast Iron Barrel Square, &c..........dis 55&10 %
Cast Iron Shutter Bolts..........dis 60&10 %
Cast Iron Chain (Sargent's list)..........dis 65&10 %
Ives' Patent Door Bolts..........dis 55&10 %
Wrought Barrel..........dis 55&10 %
Wrought Square..........dis 55&10 %
Wrought Shutter, all Iron, Stanley's list....dis 50&10 %
Wrought Shutter, Brass Knob, Stanley's list.dis 50&10 %
Wrought Shutter, Sargent's list..........dis 55&10 %
Wrought Sunk Flush, Sargent's..........dis 75&10 %
Wrought Sunk Flush, Stanley's..........dis 40&10 %
Wrought B. K. Flush, Com'n Stanley's......dis 55&2½ %
Carriage and Tire, Common......dis 80&15 @ 80&20 %
Carriage and Tire, Philadelphia, new list..........dis 70 %
Carriage and Tire, Philadelphia Pattern..........dis 70 %
R. B. & W. Carriage (old list)..........dis 70 %
Tire, Am. Screw Co.'s, Phila., new list, July 2 1883..........dis 80 %
Tire, "Bay State," new list, July 2, 1883..........dis 65 %
Tire, R. B. & W., new list..........dis 75&10 %
Stove—American Screw Co.'s..........dis 45 %
Stove, R. B. & W..........dis 45 %
Stove, R. & E. Mfg. Co..........dis 40 %
Plow..........dis 50 %
Plow, R. B. & Co..........dis 45 %
Machine..........dis 65&10 %
Bolt Ends..........dis 60&10 %

Borax...........10c ₩ lb net

Boring Machines. Upright Angular
First quality, no Augers...... $5.50 $6.75......dis 50 %
Phillips, with Augers...... 7.00 7.50..........net
Jennings & Co., no Augers...... 5.50 6.75......dis 45 %
Saunders' Patent, Regular Bed, $6.00..........dis 20 %
Saunders' Patent, Extra Bed, $6.50..........dis 20 %

Braces
Q. S. Backus..........dis 50&5 %
Barber's..........dis 40&5 %
Spofford's Patent..........dis 50&5 %
Ives' Patent Braces..........dis 55@55&5 %
Common Ball (American)..........dis 55 %
Amidon's..........dis 50 %
Barker's Imp'd..........dis 40 %
Empire..........dis 30 %
Buffalo Ball..........dis 40 %

Brackets.
Shelf, plain..........dis 50&10 %
Shelf, fancy..........dis 60&10 %
Reading, Plain..........dis 55&5&10 %
Reading, Rosette..........dis 60&5&10 %

Bright Wire Goods.
List of June 25, '83..........dis 70&10&— %

Bull Rings.
Union Nut Co..........dis 55 %
Sargent's..........dis 66⅔&10 %
Hotchkiss' low list..........dis 15 %
Humason, Beckley & Co.'s..........dis 66⅔&10 %
Peck, Stow & W. Co.'s..........dis 33⅓ & 10 %

Butts.
Wrought Brass..........dis 70@75 %
Cast Brass, Tiebout's..........dis 33⅓ %
Cast Brass, Corbin's Fast Joint..........dis 20&10 %
Cast Brass, Loose Joint..........dis 10&10 %
Fast Joint, Narrow..........dis 45&10&10 %
Fast Joint, Broad..........dis 45&10&10 %
Loose Joint..........dis 55&10&10 %
Loose Joint, Japanned..........dis 55&10&10 %
Loose Joint, Japanned with Acorns......dis 55&10&10 %
Parliament Butts..........dis 55&10&10 %
Mayer's Hinges..........dis 60&10&10 %
Loose Pin, no Acorn..........dis 55&10&10 %
Loose Pin, Acorns..........dis 55&10&10 %
Loose Pin, Acorns, Japanned..........dis 60&10&10 %
Loose Pin, Acorns, Japanned, Plated Tips.dis 60&10&10 %

WROUGHT IRON.

Fast Joint, Narrow..........dis 50&10 %
Fast Joint, Lt. Narrow..........dis 50&10 %
Fast Joint, Broad..........dis 50&10 %
Loose Joint, Broad..........dis 55&10 %
Table Butts, Back Flaps, &c..........dis 50&10 %
Inside Blind Regular..........dis 50&10 %
Inside Blind, Light..........dis 50&10 %
Loose Pin, Wrt..........dis 55&10 %
Loose Pin, Light..........dis 50&10 %
Spring Hinges:
Geer's Spring and Blank Butts..........dis 25 %
Sabin Mfg. Co.'s Double Acting..........dis 35 %
Union Spiral Spring, Japanned..........dis 25 %
Union Spring Hinge Co.'s..........dis 25 %
American Spring Hinge Co.'s..........dis 30 %
Gem Spring Hinges..........dis 30 %
Barker's Double Acting..........dis 20 %
Union Mfg. Co..........dis 25 %
Bommer's..........dis 25 %
Buckman's..........dis 25 %
Empire..........dis 50&10 %
Acme..........dis 65&10 %
Climax..........dis 50&10 %
Blind Butts, Parker..........dis 70&2 %
Blind Butts, Palmer..........dis 50&10 %
Blind Butts, Seymour..........dis 70&2 %
Blind Butts, Lull & Porter..........dis 75&10 %
Blind Butts, Nicholson..........dis 45&10 %
Blind Butts, Huffer..........dis 50 %
Blind Butts, Clark's, Nos. 1, 3, 5..........dis 70&2 %
Blind Butts, Sargent's, Nos. 1, 3..........dis 66⅔&10 %
Blind Butts, Sargent's, No. 12..........dis 70&10 %
Blind Butts, Reading's Gravity..........dis 66⅔&10 %
Blind Butts, Shepard's "Noiseless," Nos. 50, 60, 65, 45 and 55..........dis 70 %
Blind Butts, Shepard's "Gravity," Nos. 1, 3 and 5..........dis 70&10 %
Shepard's Lull & Porter Shutter Hinges....dis 70&10 %
Shepard's Reversible Shutter Hinges.......dis 70&10 %
Clark's Improved Shutter Hinge, Nos. 0, 1, 1½, 2, 2½, 3..........dis 60&10 %

Bow Ins.
Humason, Beckley & Co.'s, Nos. 1 and 2..........dis 60 %
Humason, Beckley & Co.'s other Nos......dis 66⅔&10 %
Sargent & Co.'s ....$19.70 and $21.40, dis 66⅔&10 %
Hotchkiss..........dis 25 %
Peck, Stow & W. Co..........dis 30&10 %

Butcher's Cleavers.
Humason & Beckley Mfg. Co..........dis 25 %
Bradley's..........dis 25 %
Beatty's..........dis 25&5 %

1	2	3	4	5	6	7	8
$16.50	19.00	21.50	24.00	27.00	30.00	33.50	36.50

Calipers..........see Compasses
Can Openers.—Messenger's Comet, ₩ doz, $3.00..........dis 25 %
American..........₩ gross $6.00, dis 25@30 %
Duplex..........₩ doz 25c, dis 15@20 %
Lyman's..........₩ doz $3.75, dis 20 %
No. 4, French..........₩ doz $2.25, dis 55 %
No. 5, Iron Handle..........₩ gross $0 00, dis 25@30 %
Eureka..........₩ doz $2.50, dis 10 %
Sardine Scissors..........₩ doz $7.00, dis 55 %
Star..........₩ doz $5.00, dis 25&5 %
Sprague, No. 1, $2.00; No. 2, $2.25; No. 3, $2.50..........dis 50&10 %
"Worlds Best" ₩ gross, No. 1, $12.00; No. 2, $24.00; No. 3, $30.00..........dis 50 & 10 %
Universal..........₩ doz $3.00, dis 35 %
Domestic..........₩ doz $2.50, dis 45 %
Champion..........₩ doz $2.00, dis 50 %

Caps—Percussion, ₩ 1000.
Hicks & Goldmark's
F. L. Waterproof, 1-10's..........50c
E. B. Trimmed Edge, 1-10's..........65c
E. B. Ground Edge, Central Fire, 1-10's..........70c
Double Waterproof, 1-10's..........$1.10
Pistol Waterproof, 1-10's..........75c
Musket Waterproof, 1-10's..........80c
G. D. & S. B..........33c, dis 10 %
U. M. C., F. C. trimmed..........50c / U. M. C., F. L. ground..........70c — dis 15&10 %
U. M. C., Cen. fire ground..........70c / U. M. C., Double W. Proof..........$1.40 — dis 10&5 %
Double Waterproof, in 1 10's..........$1.40 / Colt's Pistol, in 1-10's..........75c — dis 10 %
F. L..........50c / E. B. 1-10, trimmed..........65c / E. B. 1-10, ground edge..........70c — dis 10&5 %
Musket, in 1-10's..........80c, dis 33⅓ %

Cartridges.—Rim..........dis 70 %
Central Fire..........dis 45@50 %

Cards.—Horse and Curry..........dis 10 %
Cotton..........new list, Aug., '83, dis 10 %
Wool..........new list, Aug., '83, dis 10 %

Carpet Stretchers.
Cast Steel, Polished..........₩ doz $5.00, dis 30 %
Cast Iron, Steel Points..........₩ doz $2.00, dis 50&5 %
Socket..........₩ doz $2.50, dis 25 %
Bullard's..........dis 25 %

Casters.—Bed..........dis 45@50 %
Plate..........45@50 %
Shallow Socket..........dis 35&10 %
Deep Socket..........dis 33⅓ %
Martin's Patent (Phœnix)..........dis 25 %

Cattle Leaders.
Humason, Beckley & Co.'s..........dis 70&10 %
Sargent's..........dis 70&10 %
Hotchkiss..........dis 25 %
Peck, Stow & W. Co..........dis 33⅓&10 %

Chain.
Trace, 6½-10-2..........₩ pair 79c / Trace, 6½-10-3..........₩ pair 70c / Trace, 7-10-2..........₩ pair 86c — dis 35 %
German Halter Chain, list of Dec. 31, 1881..........dis 55 %
German Coil, list of Dec. 31, 1881..........dis 55 %
Covert Halter, Hitching and Breast..........dis 35&5 %
Oneida Halter Chain (old list)..........dis 45 %
Galvanized Pump Chain..........₩ lb 9½c net
Jack Chain, Iron..........dis 60&10 %
Jack Chain, Brass..........dis 50&10 %

Chalk.
White..........₩ gross 60c net
Red..........₩ gross 80c net
Blue..........₩ gross $1.00 net
White Crayons..........₩ gross 10c net

Chalk Lines.—See Lines.

Chisels.
Socket Framing, Crossman..........dis 65&5
Socket Framing, Arlington Edge Tool Co...dis 65&10
Socket Framing, Buck Bros..........1876 list, dis 22½
Socket Framing, Merrill..........dis 65&10
Socket Framing, Witherby Tool Co..........dis 65&10
Socket Framing, Douglass'..........dis 65&10
Socket Firmers, Crossman..........dis 65&5
Socket Firmers, Arlington Edge Tool Co....dis 65&10
Socket Firmers, Buck Bros..........dis 30
Socket Firmers, Merrill..........dis 65&10
Socket Firmers, Witherby Tool Co..........dis 65&10
Socket Firmers, Douglass'..........dis 65&10
Socket Corner..........dis 65&10
Tanged Firmers..........dis 40@45
Tanged Firmers, Butcher's..........$5.00@$5.25 to £
Tanged Firmers, Spear & Jackson's..........5.00 to £
Tanged Firmers, Buck Bros (Shank)..........5.25 to £
Globe Mfg. Co..........dis 65&10 %

Clamps.
Iron, Providence Tool Co.'s Wrt. Iron..........dis 25 %
Iron, Adjustable, Gray's..........dis 20 %
Iron, Adjustable, Lambert's..........dis 20 %
Iron, Adjustable, Snow's..........dis 40&5 %
Iron, Adjustable, Hammer's..........dis 15 %
Iron, Adjustable, Stearns'..........dis 20&10 %
Iron, Cabinet, Sargent's..........dis 70&10 %
Iron, Carriage Makers', Sargent's..........dis 65&10&10 %
Saw Clamps..........See Vises

Clips, Axle.
Norway or Best..........dis 60&5 %
Superior..........dis 60&5 %

Cockeyes...........dis 55 %

Cocks, Brass.
Racking / Globe / Plain Bibbs / Ale and Beer — dis. ...55 %

Coffee Mills.
Board and Box..........dis 50 %
Wilson's..........dis 50 %
Selsor's Pat..........$9.50, $10.50, dis 25 %
American (Enterprise Mfg. Co.)..........dis 20&10 %
The "Swift" (Lane Bros.)..........dis 20&10 %
Webb's Patent..........dis 45@50 %

Compasses, Dividers, &c.
Compasses..........dis 60 %
Calipers..........dis 60 %
Dividers..........dis 60 %
Bemis & Call Co.'s Dividers..........dis 60&5 %
Bemis & Call Co.'s Compasses and Callipers..dis 50&5 %
Bemis & Call Co.'s Wing & inside or outside..dis 50&5 %
Bemis & Call Co.'s Double..........dis 60 %
Bemis & Call Co.'s (Call's Patent Inside)..........dis 30 %
Excelsior..........dis 50 %
Cook's Extension..........dis 25 %
J. Stevens & Co's Calipers and Dividers....dis 25&10 %

Coopers' Tools.
Bradley's..........dis 10 @ 20 %
Barton's..........dis 20 %

Corkscrews.—Humason & Beckly Mfg.Co.dis 33⅓ %
Clough's Pat..........dis 33⅓ %

Corn Knives and Cutters.—Bradley's...dis 10 %
Wadsworths..........dis 25 %

Crow Bars
Cast Steel..........₩ lb 6½c
Iron, Steel Points..........₩ lb 5 c

Curling Irons, &c.
⅜, ⅝, ¾ in., $1.80, 2.00, 2.40..........dis 10 %
Curling Tongs..........₩ doz $3.65, dis 10 %
Pinching Irons..........₩ doz $7.50, dis 20 %

Curry Combs.
Fitch's..........dis 50&10 %
Hotchkiss, Novelty, new list, July 1880..........dis 25 %
Hotchkiss, Excir. Supr. Champion..........dis 25 %
Rubber..........₩ doz $10.00, dis 25 %

Curtain Pins.
Silvered Glass..........net
White Enamel..........net

Cutlery.
Meriden Cutlery Co. (Table)..........net
Am. Miller Bro.'s Cutlery Co..........dis 25 %
Humason & Beckley, Pocket..........dis 33⅓ %
Naugatuck Cutlery Co..........list net
Aaron Burkinshaw's Pocket..........dis 25 %

Dividers...........see Compasses
Dog Collars.—Embossed Gilt..........dis 30&10 %
Leather..........dis 40 %
Brass..........dis 40 %

Door Springs.
Torrey's Rod, regular size, ₩ doz., $3..........dis 50 %
Gray's Rod..........dis 15 %
Bee Rod..........dis 15 %
Warner's..........dis 30 %
Gem (Coil):
No. 1, Large Japanned......₩ doz $4.00 / No. 2, Medium, Japanned...₩ doz 2.75 / No. 3, Small, Japanned......₩ doz 2.00 — dis 50 & 10 %
Star (Coil)—For Cop'd, Nickel-Plated &c., see list.
No. 4 ("Shoo Fly") Screen door size, ₩ doz $1.50 / No. 5, Screen Door size..........₩ doz 2.00 / No. 6, Medium..........₩ doz 2.75 / No. 7, Large..........₩ doz 4.00 — dis 60 %
Sabin's Lever..No. 1, $1; 2, $1.50; 3, $2; 4, $2.50..dis 35 %
Sabin's Boss.No. 1, ₩ doz. $4.00; 2 $2.75; 3, $2.dis 33⅓ %
Sabin's Crown..........₩ doz $1.50, dis 33⅓ %
Philadelphia..........5 in., $6.00; 8 in., $7.75, dis 35 %
Cowell's......No. 1, ₩ doz. $18.00; No. 2, $15.00, dis 50 %
Rubber, complete..........₩ doz. $2.25, dis 10 %
Hercules..........dis 50 %

Drawing Knives.
Arlington Edge Tool Co..........dis 65&10 %
Crossman's No. 1..........dis 65&5 %
Morrill..........dis 65&10 %
Nobles Mfg. Co..........dis 15 %
Bradley's..........dis 35 %
Adjustable Handle..........dis 20 %
Witherby Tool Co..........dis 65&10 %
Douglass..........dis 65&10 %
Globe Mfg. Co..........dis 65&10 %

Drills and Drill Stocks.
Blacksmiths'..........each, $2.50, dis 20 %
Blacksmiths' Self-Feeding..........each, $7.50, dis 20 %
Breast, P. S. & W..........dis 20&10 %
Breast, Hotchkiss'..........dis 20 %
Breast, Wilson's..........dis 20 %
Breast, Millers Falls..........each, $3 00, dis 25 %
Breast, Bartholomew's..........each, $2.50, dis 25&10 %
Ratchet, Merrill's..........dis 20 %
Ratchet, Ingersoll's..........dis 25 %
Ratchet, Whitney's..........dis 20 %
Ratchet, Weston's..........dis 20 %
Ratchet, Moore's Triple Action..........dis 20&25 %
Whitney's Hand Drill, Plain, $11.00 Adjustable, $12.00..........dis %
Wilson's Drill Stocks..........dis 10 %
Automatic Boring Tools..........each, $7.25, dis 20 %

Drill Chucks.
Morse's Beach Patent..........dis 30 %
Morse's Adjustable..........each, $10.00, dis 30 %
Danbury..........each, $8.00, dis 30 %

Egg Beaters.
Dover..........₩ doz. $2.50, dis 2 %
Monroe's..........dis 50 %
National..........₩ doz. $4.50, dis 33⅓ %
Standard..........₩ gross, $18.00, dis 25 %
Family (T. & S. Mfg. Co.)..........₩ gross, $18.00, net
Acme..........₩ gross, $12.00, dis 25 %
Triumph (T. & S. Mfg. Co.)..........₩ gross, $11.50, net

Elevator Buckets.
Mill E. Buckets, light. 3½ to 10 in. (Duc's Improved), ₩ 100, $15 00 @ $54.00..........dis 10 %
Mill E. Buckets, heavy 5 to 10 in. (Duc's Improved), ₩ doz. $5.60 @ $10.20..........dis 10 %
Storehouse (Duc's Patent), 12 to 17, $12 @ $20....dis 10 %

Emery and Emery Paper.
Regular numbers..........₩ lb 6c
Flour and F. F..........₩ lb 4c
B. & A. Emery Paper..........dis 30&5 %
Sibley's Emery and Crocus Cloth, large size, $10; medium, $10.50 ₩ ream..........dis 15 %

Enameled and Tinned Ware.
Kettles..........dis 50 %
Sauce Pans..........dis 25 %
Tinned Sauce Pans..........dis 25 %

Escutcheon Pins.
Brass..........dis 50 %

Escutcheons.
Door Lock..........Same discounts as Door Locks
Brass Thread..........dis 55 %
Wood..........dis 25 %

Faucets.
Fenn's..........dis 40 %
Bohren's Patent Rubber Ball..........dis 25 %
Fenn's Cork Stops..........dis 33⅓ %
Star..........dis 55&10 %
Frary's Patent Petroleum..........dis 20&10 %
West's Patent Key..........dis 45 %
Anchor Lock..........dis 45 %
Metallic Key, Leather Lined..........dis 60 %
Cork Lined..........dis 70 %
J. Sommer's Best Metallic Key..........dis 40&10 %
J. Sommer's Cork Lined, 1st quality..........dis 50 %
Self-Measuring, Enterprise....₩ doz. $37.00 dis 20&10 %
Self-Measuring, Lane's..........₩ doz. 30.00, dis 20&10 %
Self-Measuring, Victor..........₩ doz. $36.00, dis 25&10 %

Felloe Plates...........₩ lb, 10c, dis 25 %

Files.
J. & Riley Carr..........new list April 1, '83, dis 15 %
J. & Riley Carr Horse Rasps..........dis 10 %
Butcher's..........
Moss & Gamble..........new list, dis 15 %
H. Disston & Sons..........dis 45 %
Nicholson..........dis 45 %
New American..........dis 45 %
Union File Co..........dis 45 %
Heller Bros.' Files..........dis 45 %
Heller Bros.' Horse Rasps..........dis 30&10 %
Western..........dis 45 %
Stubs..........new list, dis 25@30 %

Fluting Machines.
Knox, 4½-inch Rolls..........$3.50 each / Knox, 6-inch Rolls..........$6.00 each — dis 35 %
Eagle 3½-inch Roll..........$2.15, dis 35 %
Eagle, 5½-inch Roll..........2.85, dis 35 %
Crown, 4½-in., $3.50; 6-in., $4.00; 8-in., $6.50 each, dis 35 %
Crown Jewel..........6-in., $3.50 each, dis 35 %
American, 5-in., $3; 6-in., $3.40; 7-in., $4.50 each, dis 35 %
Domestic Fluter..........$1.50 each, net
Geneva Hand Fluter, White Metal...₩ doz $12, dis 25 %
Crown Hand Fluter, Nos. 1, $15; 2, $12.50; 3, $10.00 ₩ doz..........dis 30 %
Shepard Hand Fluter, No. 85..........per doz $15, dis 40 %
Shepard Hand Fluter, No. 110..........per doz $8.75, dis 30 %
Shepard Hand Fluter, No. 95..........per doz $6.50, dis 20 %
Clark's Hand Fluter..........₩ doz $15.00, dis 33⅓ %
Combined Fluter and Sad Iron....₩ doz $15.00, dis 30 %
Buffalo..........₩ doz $10.00, dis 10 %

Fluting Scissors..........dis 45 %

Fly Traps.
Paragon..........₩ doz, $3, net

Forks.
Hay, Manure and Spading..........dis 50 %
Plated, A 1, Rogers & Bro..........dis 40&10&5 %
Plated, Reed & Barton..........dis 40&10&5 %

Fruit and Jelly Presses.
Enterprise Mfg. Co..........dis 20&10 %

Fry Pans.
Burnished list as follows..........dis 60&10&5 %

No	0	1	2	3	4	5	6	7	8
₩ doz	$3.00	3.75	4.25	4.75	5.25	6.00	7.00	8.00	9.00

"Acme"..........dis 40&10 %

Gauges.
Marking Stanley's..........dis 50&10 %
Marking, Chapin's..........dis 55&10 %
Wire..........dis 70&10 %
Wire, Disston's..........dis 20 %
Wire, Wheeler, Madden & Co..........dis 10 %

Gimlets.
Nail and Spike..........dis 40&10 %
"Eureka" Gimlets..........dis 40&10 %
"Diamond" Gimlets..........dis 40&10 %
Double Cut, Shepardson's..........dis 40&10 %
Double Cut, Hartwell's..........dis 40&10 %
Double Cut, Ives'..........dis 40&10 %
Double Cut, Douglass'..........dis 40 %
"Bee"..........₩ gro. $12.00, dis 25 %

Glue Pots.
Tinned and Enameled..........dis 33⅓ %
Family, Howe's "Eureka"..........dis 25 %
Family, L. F. & C.'s "Handy"..........dis 30&10 %

Grindstone Fixtures.
Sargents Patent..........dis 70&10 %
Reading Hardware Co..........dis 30&10 %

Gun Wads.
U. M. C. B. E., 11 up..........$2.00
U. M. C. B. E., 9&10..........2.30
U. M. C. B. E., 7&8..........2.60
U. M. C. P. E., 11 up..........3.10
U. M. C. P. E., 9&10..........4.00
U. M. C. P. E., 7&8..........4.90 — dis 5&5 %

Halters.
Covert's Pat. Rope..........dis 50 %
Covert's Horse and Cattle Ties..........dis 50 %
Union Pat. Rope and Web..........dis 40&10 %
Union Horse and Cattle Ties..........dis 40&10 %

Hammers.
Maydole's..........dis 15 %
Cheney's, new list, March, 1883..........dis 20&5 %
Hartford Hammer Co. (new list July 1, '81)....dis 20 %
Humason & Beckley..........dis 15 %
Verree..........dis 5 %
Magnetic Tack, Nos. 1, 2, 3, $1.26, 1.50 and 1.75, dis 25&10 %
Nelson Tool Works..........dis 20&10 %
Warner & Noble's..........dis 10 %
Yerkes & Plumb..........dis 30 %
Wilkinson's Smiths'..........11½c ₩ lb net

Hand Cuffs and Leg Irons.
Providence Tool Co., Hand Cuffs, $15.00 ₩ doz.dis 10 %
Providence Tool Co., Leg Irons, $25.00 ₩ doz....dis 10 %
Tower's..........dis 25 %

Handles.—Door or Thumb Latches.

Nos.	0	1	2	3	4	
Per doz	$0.80	1.00	1.18	1.35	1.50	dis 60&10 %

Roggin's Latches..........₩ doz 35c. @ 40c. net
Bronze Iron Drop Latches..........₩ doz $0.80 @ 0.90 net
Jap'd Store Door Handles—Nuts, $1.62; Plate, $1.10; no Plate, $0.88..........net
Barn Door..........₩ doz $1.60, dis 10&10 %
Wrought Chest..........dis 70 %
Surface Chest..........dis 60&10 %
Flush Chest..........dis 70 %
Lifting..........dis 60&10 %
Saw and Plane..........dis 40&10 %
Boynton's Loop Saw Handles..........50c, dis 10 %
Boynton's Centennial Saw Handles..........30c, dis 10 %
Hammer and Hatchet..........dis 20 %
Brad Awl..........₩ gross, $2.50 dis 10 %

Hickory Firmer Chisel, assorted, ₩ gross .. $4.50
Hickory Firmer Chisel, large, ₩ gross 5.00
Apple Firmer Chisel, assorted, ₩ gross.... 5.00
Apple Firmer Chisel, large, ₩ gross.... 6.00
Socket Firmer Chisel, assorted, ₩ gross.... 3.00
Socket Framing Chisel, assorted, ₩ gross.. 5.00
File assorted, ₩ gross.... 2.75
Auger, assorted, ₩ gross.... 5.00
Auger, large, ₩ gross.... 7.00 — dis 20&10 @ 25&10
Patent Auger, Ives'..........dis 20&10 %
Patent Auger, Douglass'..........₩ set $1.25 net
Patent Auger, Swan's..........₩ set $1.00 net

Hangers.
Barn Door, old patterns..........dis 60&10 %
Barn Door, New England..........dis 65&10 %
Climax (Anti-Friction)..........dis 50 %
Challenge..........dis 50 %
"Champion" Medina Mfg. Co..........$15; dis 50&10 %
Sterling Improved (Anti Friction)..........dis 65&10 %
Cheritree..........dis 50 %
Kidder's..........dis 50&5 %
U. S..........4 in., $12; 5 in., $15; dis 60 %
The "Boss"..........dis 50&10 %
Terry's Patent..........5 in., $12; 3½ in., $10; dis 40 %
Cronk......No. 4, $12; No. 5, $14 40; No. 6, $21; dis 50

Harness Snaps.
Anchor (T. & S. Mfg. Co.)..........dis 60 %
Henshaw's, list of 1½ changed to $14.00..........dis 60 %
Judd's, list of 1½ changed to $14.00..........dis 60 @ 65 %
Fitch's (Bristol), list of 1½ change to $14.00.dis 60 @ 65 %
Hotchkiss'..........dis 10 %
Andrews'..........dis 50 %
Sargent's..........dis 70&10 %
German, low list, Sep., 1882..........dis 33⅓ %
German, Sargent's new list..........dis 60&10 %
Covert..........dis 50 %
Covered Spring, new list, Oct., 1882..........dis 60&10 %
Union..........dis 50&10 %
Union Improved German..........dis 60&10 %

Hatchets.
Isaiah Blood..........dis 30 @ 35 %

	Nos.		₩ doz	1	2	3
Shingling,	Nos. 1 2 3		₩ doz	$7.25	$8.00	$8.75
Claw,	Nos. 1 2 3		₩ doz	7.75	8.50	9.25
Lathing,	Nos. 1 2 3		₩ doz	7.50	8.00	8.50

Hunt's..........dis 25 %

	Nos.	₩ doz			
Shingling,	Nos. 1 2 3	₩ doz	$7.25	$8.00	$8.75
Claw,	Nos. 1 2 3	₩ doz	7.75	8.50	9.25
Lathing,	Nos. 1 2 3	₩ doz	7.30	8.25	9.00

Hurd's..........dis 30 @ 35 %

	Nos.	₩ doz			
Shingling,	Nos. 1 2 3	₩ doz	$8.00	$8.50	$9.00
Claw,	Nos. 1 2 3	₩ doz	9.00	9.50	10.00
Lathing,	Nos. 1 2 3	₩ doz	8.00	8.50	9.00

Yerkes & Plumb..........dis 30 @ 35 %

	Nos.	₩ doz			
Shingling,	Nos. 1 2 2	₩ doz	$7.50	$8.00	$8.50
Claw,	Nos. 1 2 3	₩ doz	8.25	8.75	9.25
Lathing,	Nos. 1 2 3	₩ doz	7.50	8.00	8.50

Simmons'..........dis 30 @ 35 %

	Nos.	₩ doz				
Shingling,	Nos. 0 1 2 3	₩ doz	$7 50	$8.00	$8.50	$9.00
Claw,	Nos. 0 1 2 3	₩ doz	....	8.50	9.00	9.50
Lathing,	Nos. 0 1 2 3	₩ doz	....	8.00	8.50	9.00
Broad,	Nos. 1 2 3 4	₩ doz	9.00	10.00	12.00	14.00
Broad,	Nos. 5 6 7 8	₩ doz	16.00	18.00	20.00	22.00

Collins..........dis 10 %

	Nos.	₩ doz			
Shingling,	Nos. 1 2 3	₩ doz	$5.50	$6.00	$6.50
Claw,	Nos. 1 2 3	₩ doz	6.00	6.50	7.00
Lathing,	Nos. 1 2 3	₩ doz	5.50	6.00	6.50

Peck's Champion Blade..........dis 30 @ 35 %

	Nos.	₩ doz			
Shingling,	Nos. 1 2 3	₩ doz	$8.00	$8.50	$9.00
Lath,	Nos. 1 2 3	₩ doz	8.00	8.50	9.00
Claw,	Nos. 1 2 3	₩ doz	9.00	9.50	10.00
Half,	Nos. 1 2 3	₩ doz	8.00	8.50	9.00
Ax Pattern,	Nos. 1 2 3	₩ doz	10.00	11.00	12.00

Hay Knives.
"Lightning"..........₩ doz $20.00 dis 10 %
Wadsworth's..........dis 33⅓ %

Hinges.
Gate, Western..........₩ doz $4.00 dis 55 %
Gate, N. E..........₩ doz $7.70, dis 55 %
Gate, N. E. Reversible..........₩ doz $5 75, dis 55 %
Gate, Clark's, Nos. 1 2 3..........dis 55 %
Gate, N. Y. State..........₩ doz $5 05, dis 55 %
Gate, Automatic..........₩ doz $12.50, dis 50 %
Gate, Common Sense..........₩ doz pair $4 50, dis 50 %
Gate, Seymour's..........dis 45&10 %
Gate, Shepard's......Nos. 1, 2, 3, 10, 20 & 25, dis 50&10 %
Rolled Blind Hinges..........dis 60&10 %
Rolled Plate..........dis 60&10 %
Rolled Raised..........dis 60&10 %
Plate Hinges "Providence" { 8, 10 & 12 in., $5.55 ₩ 100 lb; over 12 in., $4.50 ₩ 100 lb } ..dis 10 %
Screw Hook and Strap { 8, 10, 12 in., $7.00 ₩ 100 lb; 14 to 36 in. $5.75 ₩ 100 lb } ..dis 10 %
Heavy Welded Hook { 8 to 12 in., $7.00 ₩ 100 lb; 14 in & up, $5.50 ₩ 100 lb } dis 10 %
Screw Hook and Eye { ¼ & 1 in. 9c; ⅜ in., 9c; ⅝ in., 10c; ¾ in., 12c } dis 20 %
Wrought Strap and T..........dis 60&10&2 %

Hoes.
Riveted Shank..........₩ doz $5.00, dis 5 %
Socket..........₩ doz $5.25, dis 50 %
Planters'..........dis 50 %
Scovill Pattern..........dis 50 %
Handled Planters'..........dis 50%
Magic..........₩ doz $5 net
Grub..........₩ doz $11, dis 50 %

Hooks.
Bird Cage, Sargent's list..........dis 60&10 %
Bird Cage, Reading..........dis 40&10 %
Cotton..........₩ doz $4.00, dis 10 %
Cotton Patented (N. Y. Mallet & Handle W'ks),dis 30 %
Cotton (Humason & Beckley Mfg. Co)..........dis 40 %
Belt..........dis 60&10
Bench—Hotchkiss' $5.00 ₩ doz..........dis 10 %
Weston's, No. 1, $10.00; No. 2, $9.00 ₩ doz..dis 25&10 %
McGill's, $3.00 ₩ doz..........dis 10 %
Clothes Line, Sargent's list..........dis 65&10 %
Clothes line, Reading list..........dis 45&5&10 %
Ceiling, Sargent's list..........dis 60&10&10 %
Harness, Reading list..........dis 40&10&10 %
Coat and Hat, Sargent's list..........dis 60&10&10 %
Coat and Hat, Reading..........dis 40&10&10 %
Wire Coat and Hat, Gem..........dis 4 &10 %
Wire Coat and Hat, Miles'..........dis 70 %
Picture Hooks, Brown's Pat. Solid Brass, $4.00 ₩ gross..........dis 25 %
Tassel and Picture (T. & S. Mfg. Co.)..........dis 50 %
Wrought Staples and Hooks & Staples..dis 70&7½&10 %
Wrought Staples, Stanley's list..........dis 70&7½&10 %
Wire Screw Hooks and Eyes...new list, dis 70&10&— %
Grass and Bush..........dis 45@50 %
Whiffletree—Patent..........dis 40 %
Hooks and Eyes—Malleable Iron..........dis 60&10 %
Hooks and Eyes—Brass..........dis 60&10 %

Horse Nails.

	Nos. 5	6	7	8	9	10	
Ausable, ₩ lb	31c	28c	26c	25c	24c	23c	dis 30&10 %
Clinton, Plain, ₩ lb	23c	21c	20c	19c	18c		dis 30&10 %
Clinton, Fin., ₩ lb	24c	22c	21c	20c	19c		dis 30&10 %
Essex, ₩ lb	31c	28c	26c	25c	24c	23c	dis 30&10 %
Putnam "	27c	24c	22c	21c	20c	19c	dis 5&7 %
Vulcan, "	26c	23c	21c	20c	19c	18c	dis 12½ %
Globe, "	24c	21c	19c	18c	17c	16c	dis 12½ %
A. C., "	26c	23c	21c	20c	19c	18c	dis 10&10 %
Ch'mpl'in Forged "	31c	28c	26c	25c	24c	23c	dis 30 %
New Haven, "	31c	28c	26c	25c	24c	23c	dis 30&10 %
Bridgewater, "	24c	21c	19c	18c	17c	16c	dis
Saranac, "	26c	23c	21c	20c	19c	18c	dis 25%

Horse Shoes.—Burden..........₩ keg $4.37½
R. I. Horse Shoe Co., Perkins' Improve Light, Medium and Heavy..........₩ keg $4.37½
Walker's Forged, Light, Med. or Heavy..₩ keg $4.37½
Mule Shoes..........₩ keg $5.37½
Dunning's Steel..........₩ keg $9.25

Ice Awls, Chisels, &c.
American Ice Chisel..........₩ doz $3.00 net
National Ice Chisel..........₩ doz $6.25 dis 20 %
Novelty Ice Breakers..........₩ doz. $6.25 dis 20 %
White's Sliding Head Picks..........₩ doz $2 50 dis 40 %
Dunlap's Ring Picks..........₩ doz $2.00 dis 20 %
Wood Head Picks, Sargent's....₩ doz $1 60 dis 50&10 %
Iron Head Picks, Sargent's......₩ doz $1.25 dis 50&10 %
Ice Mallets, Pick in head..........₩ doz $1.75 dis 15 %
Ice Mallets, Pick in Handle..........₩ doz $2.00 dis 15 %
Ice Axes, Small Cast or Malleable..₩ doz $1.20 dis 10 %
Combination Ice Tools..........₩ doz $2.00 net

Ice Cream Freezers.
Amn. Mch. Co..........dis 40 %
Torrey's..........dis 40 %
Packer's..........dis 40 %

Ice Creepers.
Safety Reversible..........₩ gross $25 / Arctic Solid..........₩ gross $30 — dis 10 %

Ice Tongs.
Champion..........₩ doz $6.00 dis 25&10 %
Family..........₩ doz $2.75 dis 15 %

Kettles.
Brass, 7 to 15 inches inclusive..........₩ lb 28c net
Brass larger than 12 inches..........₩ lb 32c net

Knives.—Ames' Butcher Knives..........dis 20 %
Ames' Shoe Knives..........dis 15 %
Ames' Bread Knives..........₩ doz $1.50 dis 15 %
Moran's Shoe and Bread Knives..........dis 20 %
Hay and Straw, Wadsworth's..........dis 33⅓
Table and Pocket..........See Cutlery

Knobs.
Carriage (Jap'd 80c ₩ gross)..........dis 60&10 %
Base—Common..........dis 30&10 %
Hemacite Door Knobs..........new list, dis 35&5 %
Door Mineral / Door Por. Jap'd / Door Por. Plated / Door Por. — Same discounts as Door Locks.
Furniture Plain..........75c gross inch, dis 10 %
Furniture, Wood Screws..........dis 20 %
Picture, Judd's..........dis 60&10&10 %
Picture, Sargent's..........dis 60&10 %
Hemacite, Picture..........dis 35 %
Shutter, Porcelain..........dis 60&10 %

Ladles.
Melting, Sargent's..........dis 50&10 %
Melting, Reading..........dis 30&10 %
Melting, Monroe's Patent..........₩ doz $4.00 dis 30 %
Melting, P. S. & W..........dis 30&10 %

Lanterns.
Tubular..........No. 0, $7.50; No. 1, $9.00; With Guards, 40c extra } net
Nail City..........No. 1 ₩ doz $10; No. 2, $9, net
Meteor..........No. 1, ₩ doz, $9.50; No. 2 $8.50, net
Hurricane, No. 2..........₩ doz $5.75, net
Peerless, No. 5..........₩ doz $11.75, dis 10&10 %
Brady's Patent..........dis 10&10 %
Ætna..........dis 10&20 %
Yankee..........dis 10&10 %
De Beque..........dis 10&10 %
Police Small, $6.25; Med., $7.50; Large, $10.00, net
Convex Reflector..........$7.75 ₩ doz, dis 15 %

Lawn Mowers.
Excelsior and Clipper..........dis 33⅓
Pennsylvania..........dis 30 %
Philadelphia..........dis 30 %

Lemon Squeezers.
Porcelain Lined..........₩ doz $6.00, dis 30 %
Wood..........₩ doz 3.00, dis 30 %
Eureka, Tinned..........doz 8.00, dis 10 %
Dunlap's Improved..........₩ doz 2.75, dis 20 %
Sammis'...No. 1, $5 2, $8.40; 12, $15 ₩ doz; dis 25&10 %
Townsend's Patent..........$6 00 ₩ doz, dis 33⅓ %
Jennings "Star"..........$3.00 ₩ doz net
The "Boss"..........₩ doz $4.00, dis 10&10 %
Dean's Nos. 1, ₩ doz, $15.00; 2, $9.00; 3, $5.00.dis 40&10 %

Lines.—Linen Fish..........dis 25&10 %
Cotton Chalk..........dis 55 %
Silver Lake, Braided, Nos. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50 ₩ gross..........dis 20 %
Masons' Linen, No. 3½, $1.50; No. 4, $2; No. 4½, $2.50..........net
Masons' Colored Cotton..........dis 45 %
Wire Clothes, Galvanized..........each 25c@40c net

Locks and Latches.
Cabinet, Eagle / Cabinet, Gaylord / Cabinet, Bridgeport — Changes made in list price of some numbers Jan. 1, 1881, dis 40 %
Cabinet, P. & F. Corbin..........dis
Cabinet, A. E. Deitz..........dis 30@40 %
Cabinet, Stoddard Lock Co..........dis 40&5 %
Trunk, new list, Jan. 1, 1881..........dis 15&2 %
Langstroth & Crane's List, Jan. 1, '77:
Round Key, Nos. 1 to 5..........dis 40&10 %
Round Key, Nos. 5½ to 12..........dis 40&10 %
Flat Key..........dis 33⅓&10 %
A. E. Deitz, Flat Key..........dis 30@40 %
Yale Lock Co., Flat Key..........dis 40 %
"Shepardson" or "U. S."..........dis 35 %
"Felter" or "American"..........dis 33⅓ %
Plate..........dis 33⅓&2 %
F. Many's "Extension Cylinder"......$10.50 ₩ doz net
Barnes Mfg. Co..........dis 40 %

DOOR LOCKS, ETC.

Branford / Norwalk / Norwich / P. & F. Corbin / Russell & Erwin / Mallory, Wheeler & Co. / Whipple Mfg. Co. — Circular Prices: Revised list of June 14, 1881, dis 50 % and 2 % for cash.
Reading Hardware Co. (low list)..........dis 40&2 %
Padlocks—Russell & Erwin / Mallory, Wheeler & Co. / Norwich Lock Mfg. Co. / Wm. Wilcox & Co. — dis 30&10 % and 2 % for cash
Yale Lock Mfg. Co.'s "Standard"..........dis 40 %
Romer's..........dis 25 @ 40 %
Conestoga..........dis 60 %
Scandinavian (Moore Bros.)..........dis 80 %
J. H. McWilliams..........dis 10 %
A. E. Dietz..........dis 35 %
"Star"..........dis 45 %
Fraim & Bro. (new list)..........dis 50&10 %
Barnes Mfg. Co..........dis 40 %

Lustro.—4-oz. bottles, ₩ doz $1.75 ₩ gross $17.00 net

Mallets.—Hickory..........dis 10&10 %
Lignumvitæ..........dis 10&10 %
Penfield Block Co., Lignumvitæ & Hickory...dis 30 %

Meat Cutters.
Dixon's (P.S.&W.) Nos. 1 2 3 4
₩ doz..$14.00 17.00 19.00 30.00—dis 25&5 %
Miles' Challenge..........Nos. 1 2 3
₩ doz..$22.00 30.00 40.00—dis 40 %
Perry's Nos. 1 2 3 4 4 g'rd 5 g'rd
Each...$3.00 4.00 5.00 11.00 13.00 36 00—dis 25&5 %
Woodruff's (P. S. & W.)......Nos. 100 150
₩ doz..$15.00 18.00—dis 25&5 %
Hales'..........Nos. 11 12 13
₩ doz..$27.00 33.00 45.00—dis 50&10&5 %
Draw Cut..Nos. 5 6 8 10
Each..$60.00 75.00 80 00 225.00 400.00—dis 25 %
American..........dis 20&10 %
Nos. 1 2 3 4 B
Each...... $5.00 7.00 10.00 25.00 50.00 60.00
Enterprise..........dis 25 %
Nos. 10 12 22 2
Each..........$3.00 2.50 4.00 6.00 10.00
Kieser's No. 55..........$40 ₩ doz dis 40 %
Kieser's Gem..........$25 ₩ doz, dis 40 %
Kieser's Monarch..........$45 ₩ doz, dis 40 %
Kieser's Butcher..........$40 each, dis 20 %
Silver & Deming..........dis 25 %
Pennsylvania..........dis 40&10 %
Nos 1 2 3 00
₩ doz..........$24.00 28.00 36.00 28.00
Beef Shavers (Enterprise Mfg Co.)..........dis 20&10 %

Mincing Knives.
Am. (2d quality), ₩ gross, 1 blade, $7 2 blades, $12 3 blades, $18..........net
Lothrop's..........dis 20&10 %
Smith's, ₩ doz, Single, $2.25; Double, $3...dis 33⅓&10 %
Cowles Hdw. Co..........dis 55 %

Molasses Gates
Stebbins Patterns..........dis 70&10 %
Stebbins Genuine..........dis 67½&10 %
Stebbins Tinned Ends..........dis 40&10 %
Chase's Hard Metal..........dis 50&10 %
Bush's..........dis 25 %
Lincoln's Pattern..........dis 60&10 %
Weed's..........dis 15 %
Boss Nos. 1 2 3 4
$7.00 8.00 9.00 10.00.. ₩ doz. dis 60&10&10 %

Nails..........See Trade Report
Nuts and Washers...(In lots less than 10 lb ₩ lb add ½c to list; 1 lb. boxes, add 1c to list.)
Square Nuts..........8 c off list
Hexagon Nuts..........8½c off list
Washers..........7½c off list

Nut Crackers.
Table (Humason & Beckley Mfg. Co.)..........dis 33⅓ %
Blake's Pattern..........₩ doz $2.00, dis 5 %
Turner & Seymour Mfg. Co..........dis 50 %

Oakum.—is on 100 bales and over ⅛ % ₩ lb.
Best..........₩ lb c
U. S. Navy..........₩ lb c
Navy..........₩ lb 6¾c

Oilers.—Zinc and Tin..........dis 60 %
Brass and Copper..........dis 50 %
Malleable (Hammer's)..........₩ doz. $5.00, dis 10 %
Prior's Patent or "Paragon" Zinc..........dis 60 %
Prior's Patent or "Paragon" Brass..........dis 50 %
Olmstead's, Tin and Zinc..........dis 60 %
Olmstead's, Brass and Copper..........dis 50 %
Broughton's, Zinc..........dis 60 %
Broughton's, Brass..........dis 50 %

Packing, Steam.
N. Y. Belting and Packing Co..........dis 20 %

Pencils.
Faber's Carpenters'..........high list, dis 50 %
Faber's Round Gilt..........₩ gross $5.25, net
Dixon's Lead..........₩ gross $4.50, net
Dixon's Lumber..........₩ gross $6.75, net
Dixon's Carpenters'..........dis 40&10 %

Picks.
Railroad, 5 to 6, $11.00; 6 to 7, $12.00..........dis 50 %
Adze Eye, 5 to 6, $12.00; 6 to 7, $13.00..........dis 50 %

Picture Nails.
Brass Head, Sargent's list..........dis 60&10 %
Brass Head, T. & S. Mfg. Co..........dis 50 %
Porcelain Head, Sargent's list..........dis 50&10 %
Porcelain Head, Judd's list..........dis 40@40&10 %
Porcelain Head, T. & S. Mfg. Co..........dis 40 %
Niles' Patent..........dis 40 %

Pinking Irons...........₩ doz 75c, net

Plaiting Machines.
Magic..........₩ doz $10.00, net
Astor Plaiting Machine..........each $15.00, dis 20 %
Crown Plaiting Machines..........dis 25 %
6 in., $6.00; 10 in., $8.00 each.

Planes and Plane Irons.
Bench, First Quality..........dis 20 %
Bench, Second Quality..........dis 25 %
Molding..........dis 15 %
Bailey's (Stanley R. & L.Co.) new list, Jan.'79.dis 20&10 %
The Stanley (S. R. & L. Co.) new list, Jan.'79..dis 20&10 %
Bailey's "Victor"..........dis 20&10 %
Defiance Adjustable..........dis 20&10 %
Laflin Mfg. Co..........dis 35 %
Plane Irons, Butcher's..........$5.00 @ $5.25 to £
Plane Irons, Buck Bros..........$5.00 to £
Plane Irons, Auburn Tool Co..........dis 20 & 10 %
Plane Irons, The Globe Mfg. Co., "Baldwin Iron"..........dis 20 & 10 %
Plane Iron, Ohio Tool Co..........dis 20&10 %
Plane Irons, Sandusky Tool Co..........dis 20&10 %

Pliers and Nippers.
Button's Patent..........dis 33⅓ %
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 7 in., $21.00 ₩ doz..........dis 25 %
Humason & Beckley Mfg. Co..........dis 30&10 %
Gas Pliers..........dis 55 %
Eureka Pliers and Nippers..........dis 40 %
Russell's Parallel..........dis 25 %
P. S. & W. Cast Steel..........dis 33⅓&10 %
P. S. & W. Tinners' Cutting Nippers....add 6 % dis 10 %

Plumbs and Levels.
Disston's..........dis 40 %
Stanley R. & L. Co.'s Pat. Adjustable..........dis 65&10 %
Stanley R. & L. Co.'s Non-Adjustable..........dis 65&10 %
Chapin's Patent Adjustable..........dis 65&10&10 %
Chapin's Non-Adjustable..........dis 65&10&10 %
Standard Rule Co.'s New Adjustable..........dis 65&10 %
Standard Rule Co.'s Non-Adjustable..........dis 65&10 %
Johnson's Patent Adjustable..........dis 65&10 %
Pocket Levels..........dis 65&10 %
Davis' Inclinometers..........dis 20 %

Post Hole and Tree Augers.
Samson Post Hole Digger..........₩ doz $37.50, dis 20 %
Fletcher Post Hole Augers..........₩ doz $30.00, dis 20 %
Vaughan's Post Hole—6 in., $23.60; 7, 8 and 9 in., $25.00 ₩ doz....dis 20&10 %
Eureka Diggers ₩ doz $27.00..........net
Leed's each $2.50..........net

Pruning Hooks and Shears.
Disston's Combined Pruning Hook and Saw, ₩ doz $19.00, dis 20 %
Disston's Pruning Hook..........₩ doz $12.50, dis 20 %
E. S. Lee & Co.'s Pruner..........dis 33⅓ %
Pruning Shears..........₩ doz $5.50 @ 6.00
Wheeler, M. & Co.'s Combination....₩ doz $12, dis 20 %
Dunlap's Saw and Chisel..........₩ doz $9.00, dis 10 %

Pulleys.
Hot House and Tackle..........dis 65&10 %
Jap'd Screw..........dis 65&10 %
Brass Screw..........dis 70&10 %
Jap'd Side..........dis 65&10 %
Jap'd Clothes Line..........dis 60&10 %
Hay Fork, Solid Eye....$4.50; Swivel, $5.00, dis 50&10 %
Hay Fork, "Anti Friction"..........$6.75, dis 10&10 %
Hay Fork, "F" Common and Pat. Bushed.....dis 20 %
Hay Fork, Tarbox Pat. Iron..........dis 20 %
Shade Rack..........dis 45 %

Punches.
Belt or Drive..........₩ doz $2.00; 2.25 4.50, dis 50 %
Bemis & Call Co.'s Cast Steel Drive..........dis 50&5 %
Bemis & Call Co.'s Springfield Socket..........dis 50&5 %

Spring	₱ do $7.00, dis 50&7½ %
Spring, Leach's Patent	dis 15 %
Bemis & Call Co.'s Spring and Check	dis 40 %
Solid Tinners'	₱ doz $1.14, dis 40 %

Rail.

Sliding Door, Wrought Brass	₱ ℔ 43c, dis 33⅓ %
Sliding Door, Bronzed Wrt. Iron	₱ foot 12c, dis 40 %
Sliding Door, Iron, Painted	₱ foot 4c, dis 10&10 %

Barn Door....Inch ... ⅛ ¼ ⅜

Per 100 feet $2.60 3.00 4.00—dis 10 %

B. D. for N. E. Hangers—

	Small.	Med.	Large.
Per 100 feet	$2.10	2.70	.90—net

Terry's Wrought Iron, 50c ₱ foot. 0c

Razors.

J. R. Torrey Razor Co.	dis 15 %

Razor Strops.

Genuine Emerson	dis 45 %
Badger's (not Emerson)	dis 33⅓ %
Imitation Emerson	₱ doz $2.00, dis 20 %
Hunt's	dis 40&5 %
Chapman	dis 15 @ 2 %
Saunder's	dis 10 %
Torrey's	dis 20 %

Rivets.

Iron and Tinned, new list, Dec. 10, 1881	dis 40 %
In bulk, new list, Dec. 10, 1881	dis 20 %
Copper Rivets and Burrs	dis 50 %

Nos.. 7 8 9 10 11 12 13 14 15

₱ ℔. 49c 50c 52c 54c 56c 58c 60c 65c 70c

Rivet Sets	dis 33⅓&10 %

Rods.

Stair, Brass	dis 25 %
Stair, Black Walnut	60c. ₱ doz. dis 10 %

Rollers.

Barn Door, Sargent's list	dis 5c&10&10 %
Acme (Anti-Friction)	dis 50 %

Rope.

Mnfs' List, August 3, 1883	dis 10 ₱ ℔
Manila	½ inch and larger ₱ ℔ 15½c
Manila	⅜ inch ₱ ℔ 16 c
Manila	¼ and 5-16 inch ₱ ℔ 6½c
Manila, Tar'd Rope	₱ ℔ 15 c
Manila, Tar'd Lath Yarn	₱ ℔ 15 c
Manila, Hay Rope	₱ ℔ 15½c
Sisal	½ inch and larger ₱ ℔ 10½c
Sisal	⅜ inch ₱ ℔ 11 c
Sisal	¼ and 5-16 inch ₱ ℔ 11½c
Sisal Hay Rope	₱ ℔ 12c

Rules.

	Boxwood.	Ivory.
Chapin's, Standard, Stanley	dis 70&10 %	dis 45@55 %

Stephens	dis 70&10 % ..... dis 45%

Sad Irons.

From 4 to 10	₱ ℔ 2¾c net
Self-Heating	₱ doz $9.00 net
Self Heating, Tailors'	₱ doz $18.00 net
Gleason's Shield and Toilet	dis 20 %
Mrs. Pott's Irons, Doubled Pointed	dis 35 %
Mrs. Pott's Irons Square Back	dis 35 %
Enterprise Star Irons, new list, July 20, 1882	dis 10 %
Combined Fluter and Sad Iron	₱ doz $15.00, dis 10 %
Chinese Laundry (N. E. Butt Co)	8½c. dis 15&
New England	8c dis 15 %

Sand Paper.

Baeder & Adamson's Flint, 00 to 1½	$4.50 ₱ ream
Baeder & Adamson's Flint, 2, 2½ & 3	5.0 ₱ ream
Baeder & Adamson's Flint, Assorted	4.75 ₱ ream
Baeder & Adamson's Star	3.75 ₱ ream
Baeder & Adamson's Emery	₱ ream $6.50 @ 11.50
Bartles Flint	$4.75&$5.25 ₱ ream dis 35 %
Bartles Harrison, $4.75 ₱ ream	dis 35 %
New England same list as B. & A. Flint	dis 35 %
Sage's	dis 20&5 %

dis 30&5 %

Sash Cord.

Common	₱ ℔ 13c net
Patent	₱ ℔ 15c net
Silver Lake, Hemp	₱ ℔ 50c, dis 10&5 %
Silver Lake, White Cotton	₱ ℔ 50c, dis 10&5 %
Silver Lake, Drab Cotton	₱ ℔ 55c, dis 10&5 %
Raw Hide, ₱ foot, ¼ in., 5c.; 5-16 in., 7c.; ⅜ in., 10c.	dis 15 %
Steel Ribbon	dis 10 %

Sash Locks.

Clark's, No 1, $10.00; No. 2, $8.00 per gross	dis 33⅓ %
Ferguson's	dis 33⅓ %
Walker's	net
Hammond's Window Springs	dis 25 %
Northup Window Springs, No. 1, $10.00 ₱ gross	dis 15 %
"Common Sense," Japanned, Coppered and Bronzed	₱ gross $5.00 net
Common Sense," Nickel Plated	₱ gross $10 00 net
Universal"	dis 40 %

Sash Weights.

Solid Eyes, in 400 ℔ lots and over	₱ ℔ 1¾cnet

Sausage Stuffers or Fillers.

Miles "Challenge"	₱ doz $20, dis 40 %
Perry	₱ doz. No. 14; No. 0, $21, dis 20&10 %
Draw Cut No. 4	each $30.00, dis. 20 %
Enterprise Mfg. Co	dis 25%
Silver's	dis 25 %

Saws.

Disston's Circular, Mill and Cross Cut	dis 40 %
Disston's Hand, Panel, Rip, &c	dis 20 %
Boynton's Lightning Cross Cuts, new list	dis 40 %
Boynton's Circular and Mill	dis 40 %
Boynton's Ice	dis 25 %
Boynton's Lightning Hand, Panel and Rip	dis 25 %
Wheeler & Clemson Mfg. Co.'s Hand	dis 30 %
W. M. & C. Mfg. Co. Cross Cuts	dis 30 %
Livingston's Butcher and Kitchen	dis 20 %

Livingston's Framed Wood—

Nos 101 102 103 104 105

Per doz.. $10.00 8.50 10.00 7.50 5.20 net

Peace Circular and Mill	dis 40 %
Peace Hand, Panel and Rip	dis 25 %
Peace Cross Cuts	dis 35 %
Peace Band Saws, all widths	dis 10 %
Richardson's Circular	dis 40 %
Richardson's Mill and X Cut	dis 40 %
Richardson's Hand Panel, Butcher and Web Saws	dis 25 %

Saw Frames.

White Vermont	₱ doz $1.50, dis 25&10%
Red, Polished and Varnished	₱ doz $1.50, dis 10%
Saw Rods	$10 list, dis10 & 10%

Saw Sets.

Boynton's Patent X Cut, per doz, $12.00; Hand Saw per doz, $10.00	dis 25 %
Stillman's Genuine	₱ doz $3.50 and $5.50 dis 10 %
Stillman's Imitation	₱ doz $3.25, dis 30&10 %
Common Lever	₱ doz $2.00, dis 30&10 %
Leach's No 0, $8.00; No. 1, $15.00, dis 15 %	
Nash's	dis 20&10 %
Hammer, Hochkiss	$5.50, dis 10 %
Hammer, Bemis & Call Co.'s new Patent	dis 30&5 %
Bemis & Call Co.'s Lever & Spring Hammer	dis 30&5 %
Bemis & Call Co.'s Plate	dis 10 %
Bemis & Call Co.'s Cross Cut	dis 12½ %
Aiken's Genuine	$13.00, dis 50&10 %
Aiken's Imitation	$8.00, dis 55 %
Hart's Patent Lever	dis 20 %
Disston's	dis 20 %
Morrill's No. 1, $15 No. 0, $12, dis 40&5 %	

Scales.

Hatch, Counter, No. 171	₱ doz $42, dis 45 %
Hatch, Tea, No 161	₱ doz $15.00, dis 45 %
Union Platform	$6.00, dis 45 %
Fairbanks'	dis 20 %
Richlé Bros	dis 20 & 10 %
Buffalo Scale Co	dis 20&5 %
Forsyth Scale Co	dis 25 %
Howe's	dis 20&10 %
Chatillon's Grocers'	dis 40 %
Chatillon's Eureka	dis 25 %
Family Universal, 12 ℔, $30; 24 ℔ $36	net
Family Favorite	dis 30 %
Family, Turnbull's	dis 30 %
Scale Beams, List of January 12, 1882	dis 4 &10 %

Scrapers.

Adjustable Box Scraper (S. R. & L. Co.)	$6.50, dis 20&10 %
Box 1 Handle	₱ doz $4.00, dis 10 %
Box Handle	₱ doz $6.00, dis 10 %
Defiance Box and Ship	dis 20&10 %
Foot	dis 50&10 %
Ship, common	₱ doz $3.50 net
Ship, Providence Tool Co	dis 10 %

Screen Corners.

Porter's Pat Windowand Door Frame	dis 33⅓

Screw Drivers.

Douglas Mfg. Co	dis 20&10&10 %
Disston's	dis 20 %
Disston's Patent Excelsior	dis 40 %
Buck Bros	dis 25 %
Stanley Rule & Level Co.'s, Varnished Hdls	dis 50&10 %
Stanley Rule & Level Co.'s, Black Handles	dis 50&10 %
Sargent & Co.'s	dis 50&10 %
Ray's Double Action Ratchet ₱ doz, 4 in., $6.00; 5 in., $10.20; 6 in., $12.00—dis 35 %	
Mallett & Co.'s Double Action Clutch ₱ doz, 4 in., $7.40; 5 in., $8.00; 6 in., $9.00—dis 15 %	
Champion	dis 25 %
Clark's Patent	dis 25 %

Screws.

Flat H'd Iron, new list, Dec 27, 1882	dis 55 %
Round Head Iron, new list, Dec. 27, 1882	dis 55 %
Flat Head Brass, new list Dec. 27, 1882	dis 55 %
Round Head Brass, new list, Dec. 27, 1882	dis 45 %
Brass and Silver Capped	dis 40 %
Japanned, list of Plain Screws	dis 50&10 %
Coach, Patent Gimlet Point	dis 70 %
Sled	dis 15&40 %
Machine, Flat Head, Iron	dis 55 %
Machine, Round Head, Iron	dis 50 %
Bench, Iron	dis 55&10 %
Bench, Wood, Beech	₱ doz $3.00, dis 10 %
Bench, Wood, Hickory	dis 25&10 %
Hand, Wood	dis 25&10 %
Hand Rail, Sargent's	dis 66⅔&10 %
Hand Rail, Humason, Beckley & Co.'s	dis 66⅔&10 %
Hand Rail, Am. Screw Co., list of Jan. 1, '81	dis 70 %
Jack (Wilson's)	dis 25 %

Screw Window Balances.

C. B. Hugunin's, No. 1, $2.10; No. 2, $1.75; No. 3 $1.00	₱ doz net

Scroll Saws.

Foster, $10.00	dis 25 %
Rogers, $3.50	dis 25 %

Shears and Scissors.

American (Cast) Iron	dis 70&5&10 %
Pruning	see Pruning Hooks and Shears.
Barnard's Lamp Trimmers	₱ doz $1.75
Tinners'	add 6 %, dis 10 %
Seymour's, List, Dec., 1881	dis 50 %
Heinsch's, List, Dec., 1881	dis 50 %
Heinsch's Tailor's Shears	dis 33⅓ %
Mass. Cutlery Co. St. Trimmers	dis 75 %
Cast Steel Trimmers	dis 50 %
Wiss, J., & Sons' list, Dec., 1881	dis 50 %
Wiss, J., & Sons' Tailors' Shears	dis 40 %

Sheaves.

Sliding Door, M. W. & Co. list	dis 5 &10&2 %
Sliding Door, R. & E. list	dis 60&10&2 %
Sliding Door, Patent Roller	dis 60&10&2 %
Sliding Door, Patent Roller, Hatfield's	dis 50&10&2 %
Sliding Door, Russell's Anti-Friction	dis 60&10&2 %
Sliding Door, Moore's Anti-Friction	dis 0c %
Sliding Shutter, R. & E. list	dis 50&10&2 %
Sliding Shutter, Sargent's list	dis 60&10 %
Sliding Shutter, Reading list	dis 60&10 %
Moore's Anti-Friction (Hanging)	dis 50 %

Shovels and Spades.

Ames, New list, July 1, 1881	dis 15 %
Griffiths	dis 50&5 %
Old Colony	dis 15 %
Wayne Pettebone & Son, new list	dis 40&10 %
Wayne Pettebone & Son, R. R. Shovels	dis 15 %
Pennington's (Lowman's Patent)	dis 30 %
Rowland's	dis 50&5 %

Shovels and Tongs.

Iron and Brass Head, R. & E. list	dis 60&10&2 %
Iron and Brass Head, P. S. & W	dis 50&10&10 %
Polished Steel, new list	dis 50&10&2 %

Slates.

Square Frames, by case	dis 70 %
Less than a case	dis 60&10 %

Spoke Shaves.

Defiance Metallic	dis 20&10 %
Iron	dis 45 %
Wood	dis 30 %
Bailey's (Stanley R. & L. Co.), new list	dis 30&10 %
Stearns'	dis 30&10 %

Spoke Trimmers.

Bouney's	₱ doz $10.00, dis 40&5 %
Stearns'	₱ doz $9.00, dis 20&10 %
Ives' No. 1, $15.00; No. 2, $12.00 ₱ doz, dis 55&10 %	
Douglass'	₱ doz $9.00, dis 15 %

Spoons.

Basting	dis 5c&10 %
Solid Table and Tea	dis 5c %
Britannia	dis 50&10 %
Reed & Barton	dis 40&10&5 %
Holmes, Booth & Haydens	dis 40&10&5 %
German Silver	dis 30&10&5 %
Cast Steel, Silver Plated	dis 33⅓ %
Tin (P. S. & W.), Teas	$1.25 ₱ gross, net
Tin (P. S. & W.), Tables	$2.00 ₱ gross, net
Tin (Cowles Hdw. Co.)	dis 10 %
Tin (Cowles Hdw Co.), case lots	dis 20 %

Stocks and Dies.

Lightning" Screw Plate	dis 5&10 %

Stone.

Hindostan No. 1, 9c; Axe, 8c	dis 10 %
Sand Stone	₱ ℔ 5c, dis 14½&10 %
Washita Stone	No. 1, ₱ ℔ 18c net
Washita Stone	No. 2, ₱ ℔ 16c net
Washita Stone, Slips	No. 1, ₱ ℔ 37c net
Arkansas Stone No. 1, 4 to 6 in	₱ ℔ $1.35 dis 10 %
Arkansas Stone No. 1, 6 to 9 in	₱ ℔ $2.00 dis 1 %
Turkey Oil Stone (Chase) 4 to 8 in.	₱ ℔, 60c, dis 10 %
Turkey Slips (Chase)	$1.7 ₱ ℔ dis 10 %
Lake Superior (Chase)	₱ ℔ 16c, dis 10 %
Lake Superior, Slips (Chase)	₱ ℔ 30c, dis 10 %
Grindstones, Family, Loring's	dis 10 %

Stove Polish.

Joseph Dixon's	₱ gross $6.00, dis 10 %
Gem	₱ gross $4.50, dis 10 %
Gold Medal	₱ gross $6.00, dis 25 %
"Mirror"	₱ gross $6.00, dis 5 %
Lustro	₱ gross $4.75, net
Ruby	₱ gross $3.75, net
Rising Sun	₱ gross $6.75, net
Dixon's Plumbago	₱ ℔ 8c. net

oynton's Noon Day ₱ gross No. 1, large, $6.50 No 2, small, $5.00; No. 3 medium, $4.

Squares.

Steel and Iron	dis 50&10&2 %
Nickel Plated	dis 50&10&2 %
Try Square and T Bevels	dis 50&10 %
Disston's Try Square and T Bevels	dis 40 %
Winterbottom's Try and Mitre	dis 20&10 %

Tacks, Brads, &c.

New List, Sept. 1, 1882.

Tinned Swedes Tacks	dis 30 %
Tinned American Tacks	dis 30 %
Swedes Tacks, all kinds	dis 30 %
American Cut Tacks	dis 30 %
Copper Tacks and Nails	dis 30 %
Swedes Hungarian Nails	dis 30 %
Gimp and Lace Tacks	dis 30 %
Gimp and Lace Tacks, Tinned	dis 30 %
Finishing Nails	dis 25 %
Trunk and Clout Nails	dis 25 %
Common and Patent Brads	dis 20 %
Basket Nails	dis 20 %
Brush Tacks	dis 20 %
Leathered Carpet Tacks	dis 20 %
Cigar Box Nails	dis 20 %
Chair Nails	dis 20 %
Double-pointed Tacks	dis 20& 5%

Extra 10 % on all.

Tap Borers.

Common and Ring	dis 20 %
Ives' Tap Borers	dis 15&10 %
Enterprise Mfg. Co	dis 20&10 %

Tapes, Measuring.

American	dis 25 %
Spring	dis 25&10 %
Chesterman's	regular list dis 15 %

Thermometers.

Tin Case	dis 75&10@80 %

Tobacco Cutters.

Enterprise Mfg. Co. (Champion)	dis 20&10 %
Wood Bottom	₱ doz $10.00, dis 25&10 %
All Iron	₱ doz $8.25, dis 15 %
Nashua Lock Co.'s	₱ doz $18.00 dis 50&5 %
Wilson's	dis 35 %
Clipper (Sargent & Co.)	₱ doz $18.00, dis 20 & 10 %

Toe Calks.

Winsted	₱ ℔ 9c, dis 5

Tinners' Tools and Machines.

Machines (P. S. & W.)	list add 20 %
Tools (P. S. & W.)	add 6 % dis 10 %

Transom Lifters.

Wollensak's Patent	dis 35 %
Reiher's Patent, new list, Feb., 1882	dis 20&10&10 %
Excelsior	dis 50&10&2 %

Traps.

Game, Newhouse	dis 35 %
Game, Oneida Pattern	dis 60 %
Game, Blake's Patent	dis 40&5 %
Mouse, Wood, Choker	₱ doz holes, 15c
Mouse, Round Wire	₱ doz $1.50, dis 10 %
Mouse Cage, Wire	₱ doz $2.40, dis 10 %
Mouse, Catch-em-alive	₱ doz $2.50, dis 15 %
Mouse, "Bonanza"	per gross $10.00 net
Rat, "Decoy"	₱ doz $10.00, dis 10 %

Trowels.

Lothrops' Brick and Plastering	dis 25 %
Reed's Brick and Plastering	dis 15 %
Disston's Brick and Plastering	dis 20 %
Peace's Plastering	dis -5 %
Clement & Maynard's	dis 20 %
Rose's Brick	dis 15 %
Brades' Brick	dis 25 %
Worrall's Brick and Plastering	dis 20 %
Garden	dis 55 %

Triers.

Butter and Cheese	dis 25 %

Trucks (Warehouse, &c.

Penfield Block Co.'s list, 1882	dis 40 %

Vises.

Solid Box	dis 35 %
Solid, Peter Wright's	15½c
Solid, Wilkinson's	14@15c
Parallel, Parker's	dis 30 %
Parallel, Wilson's	dis 35&10 %
Parallel, Howard's	dis 20&10 %
Parallel, Merrill's	dis 15 @ 20 %
Parallel, Sargent's	dis 60&10 %
Parallel, Backus and Union	dis 40 %
Parallel, Double Screw Leg	dis 15&10 %
Parallel, Prentiss	dis 25 %
Parallel, Simpson's Adjustable	dis 25&5 %
"Family," List	net
Saw Filers, Bonney's	₱ doz $24.00, dis 20&10 %
Saw Filers, Stearn's	dis 20&10 %
Saw Filers, Hopkins'	₱ doz $17.50, dis 10 %
Saw Filers, Reading	dis 25&10 %
Cowell Hand Vises	dis 20 %
Richardson's Vise and Anvil	dis 25 %

Washer Cutters.

Smith's Patent	₱ doz $12.00, dis 25 %
Johnson's	₱ doz $11.00, dis 33⅓ %
Penny's ₱ doz Pol. $17.50; Jap'd, $16.50	dis %
Appleton's	₱ doz $16.00, dis 60&10 %

Washers.—See Nuts and Washers.

Well Wheels	dis 60&10 %

Wire.

Brass and Copper	dis 33⅓ %
Market, Bright an Annealed	dis 55 @ 57½ %
Market, Coppered	dis 50 @ 52½ %
Market, Galvanized	dis 45 @ 47½ %
Market, Tinned, Tinned list	dis 47½ @ 50 %
Stone, Bright and Annealed Nos. 6 to 18	dis 57½ @ 60 %
Stone, Bright and Ann aled Nos. 19 to 26	dis 60 @ 65 %
Stone, Bright and Annealed Nos 27 to 36	dis 62½ @ 70 %
Stone, Galvanized Nos. 19 to 30	dis 45 @ 47½ %
Stone, Tinned, Tinned list	dis 45 @ 47½ %
Tinned Broom Wire	dis 57½ @ 60 %
Cast Steel Wire	dis 47½ @ 50 %
Annealed Fence, Nos. 8 & 9	dis 57½ @ 60 %
Annealed Grape, Nos. 10 to 14	dis 57½ @ 60 %
Fence Staples	₱ ℔ 5½ @ 5½c
Fence Staples, Galvanized	₱ ℔ 6½ @ 6½c
Stubs Steel Wire	$5.00 to $ dis 30 %
Japanned Barb Fence	₱ ℔ 6½c
Galvanized Barb Fence	₱ ℔ 7½c
Steel Music Wire, Nos. 7 to 30	$1.00 ₱ ℔
Picture Wire, T. S. & J	dis 40 %
Clothes Line Wire, Galvanized	₱ coil 25 @ 40c net
Wire Cloth, green, drab and black	₱ sq. ft., 2c, 6c
2½c	net

Wrenches.

American Adjustable	2.0 45 %
Baxter's Adjustable "S," list Jan., 1880	dis 20&5 %
Baxter's Diagonal	dis 20&5 %
Coes' Genuine	dis 50&3 %
Coes "Mechanics"	dis 50&10&3 %
Coes' Pattern, Malleable	dis 75 %
Coes' Pattern Wrought	dis 5c@70 %
Girard Standard	dis 60 %
Girard Adj	dis 70 %
Bemis & Call's Patent Combination	dis 20 %
Bemis & Call's Merrick's Pattern	dis 35 %
Bemis & Call's Brigg's Pattern	dis 25 %
Bemis & Call's Cylinder or Gas Pipe	dis 40 %
Van Wagoner & Williams' Basin	₱ doz $4.50
Aiken Pocket (Bright)	$6.00, dis 50&10 %
The Favorite Pocket (Bright)	₱ doz $4, dis 40 %
Webster's Patent Combination	dis 25 %
Taylor's Farmers'	dis 25 %

Wringers.	Per doz.
Universal, XX, No. 2½	42.00
Universal XX, No. 2	48.00
Universal, XX, No. 1½	54.00
Universal XX, No. 1	96.00
Peerless, no Cogs, No. 1	42.00
Peerless, with Cogs, No. 2½	45.00
Peerless, with Cogs, No. 2	48.00
Peerless, with Cogs, No. 3	54.00
Peerless, with Cogs, No. 4	96.00
Eureka, No. 2	42.00
Novelty No. 2, for Common Tubs	42.00
Novelty No. 3, for Common Tubs	48.00
Excelsior No. E, for Stationary Tubs	51.00
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Excelsior No. A, with Folding Bench	60.00
Excelsior No. B with Folding Bench	66.00

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Florence Sewing Machine Co., Florence, Mass.
Sargent & Co., New Haven, Ct.
P. & F. Corbin, New Britain, Ct.
Stanley Works, New Britain, Ct.
Landers, Frary & Clark, New Britain, Ct.
Eaton, Cole & Burnham Co., Bridgeport, Ct.
Norwalk Lock Co., Norwalk, Ct.
Bradley & Hubbard Mfg. Co., Meriden, Ct.
Charles Parker Co., Meriden, Ct.
Washburn & Moen Mfg. Co., Worcester, Mass.
Trenton Lock and Hardware Co., Trenton, N. J.
Peck, Stow & Wilcox Co., Southington, Ct., and Cleveland, Ohio.
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Buffalo Hardware Co., Buffalo, N. Y.
Sidney Shepard & Co., Buffalo, N. Y.
Enterprise Mfg. Co., Philadelp'a, Pa.
E. & T. Fairbanks & Co., St. Johnsbury, Vt.
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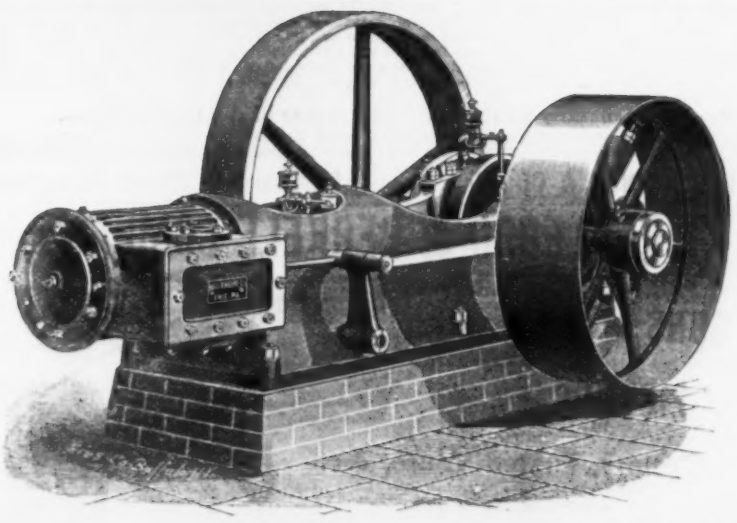

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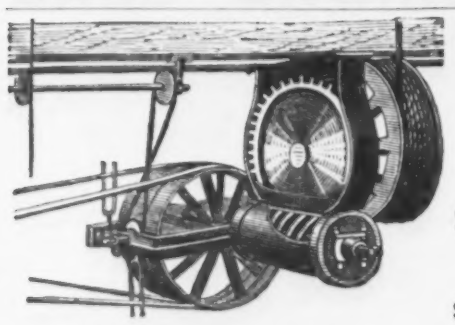

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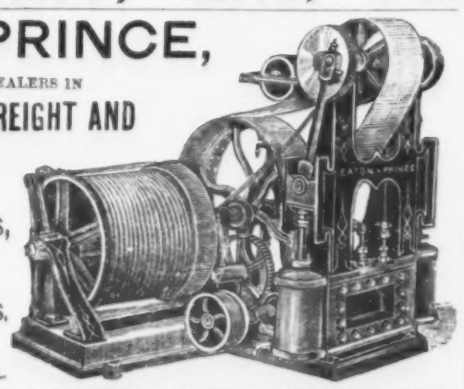

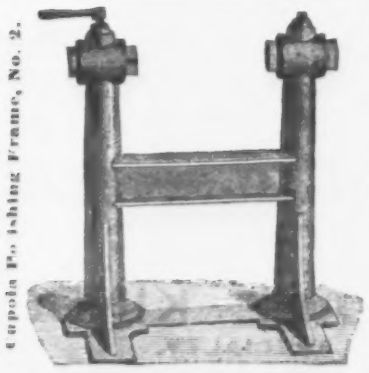

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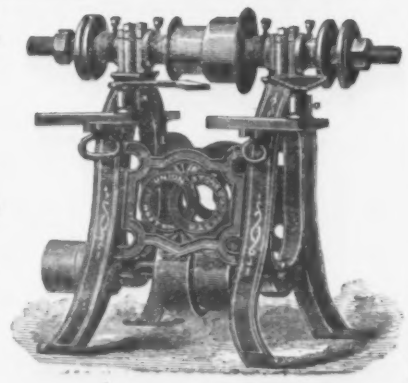

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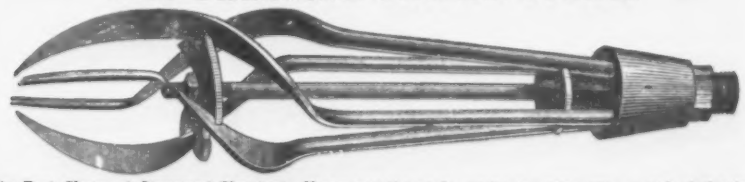

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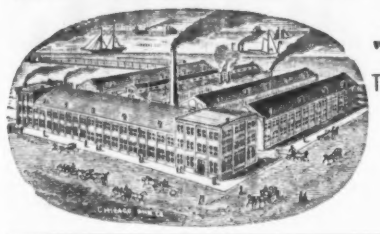

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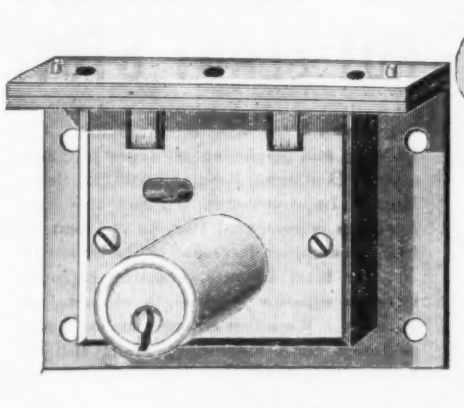

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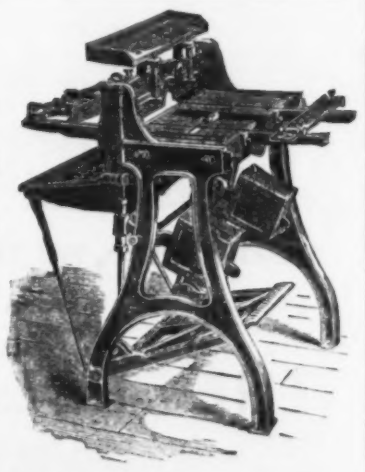

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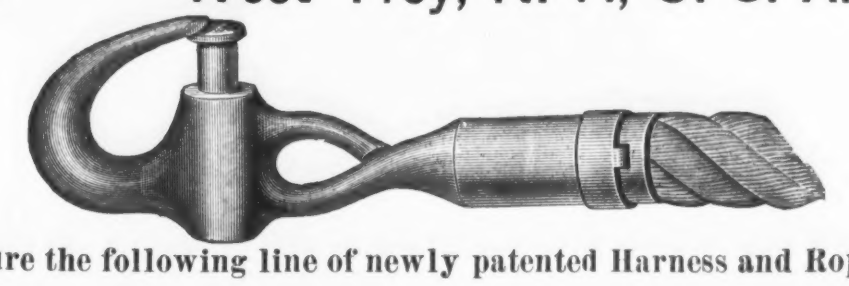

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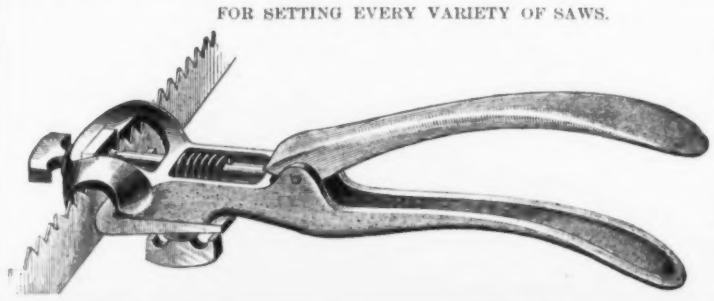

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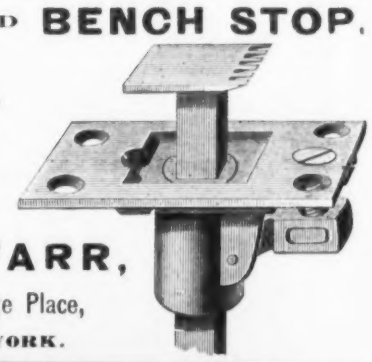

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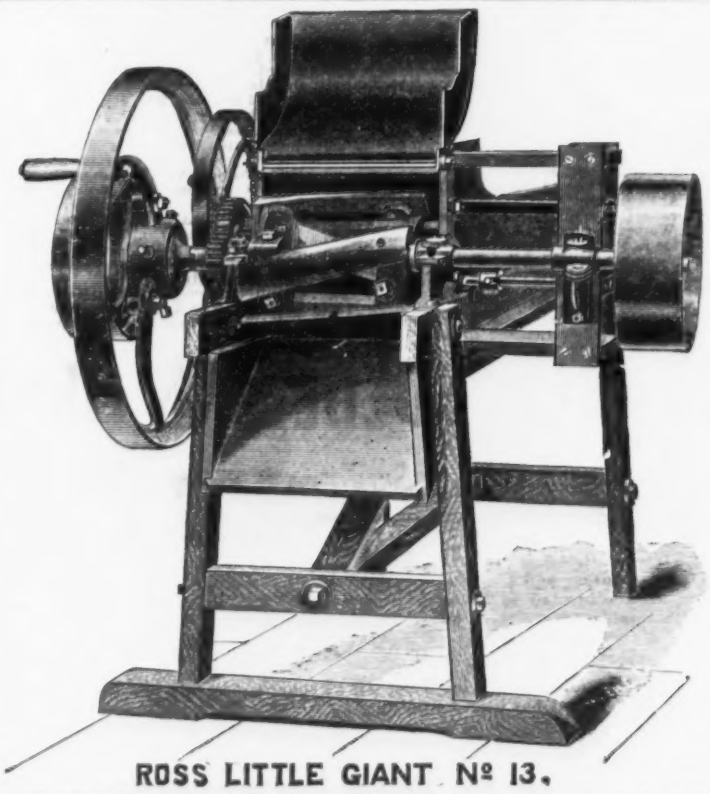

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MANUFACTURERS OF
BOILERS, SHEET IRON, ROLLING MILL AND BLAST FURNACE WORK
Of all Kinds.
Vertical Boilers and Engines a Specialty. Repairing Done Promptly.
29th Street and A. V. R. R.,
PITTSBURGH.
Specifications for Boilers furnished free of charge.

SCROLL SAWS

The "Challenge" and "Rival" are the finest foot power Scroll Saws in the world, with or without Lathe attachment.
Price, $10 to $20.
New Catalogue free. Address
SENECA MFG. CO.,
Seneca Falls N. Y., U. S.

Dynamite, Nitro Glycerine,
BLASTING MATERIALS.
Contracts Taken for Clearing Lands of Stumps.
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THE HERCULES POWDER COMPANY
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GEO. M. EDDY & CO.,
Manufacturers of
Measuring Tapes
Of Cotton, Linen & Steel,
FOR ALL PURPOSES.
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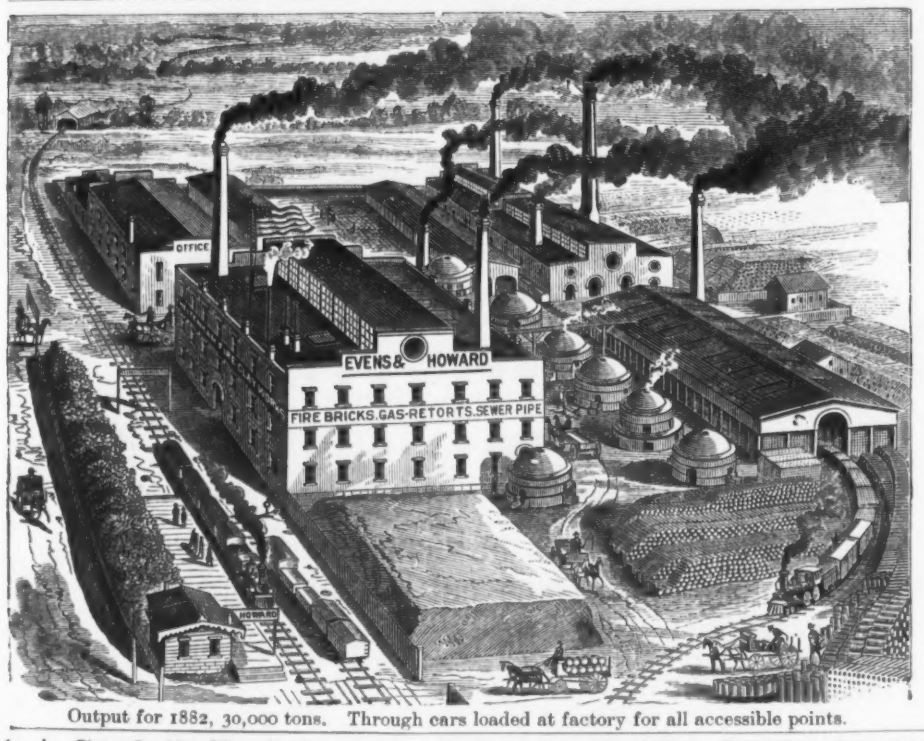

Output for 1882, 30,000 tons. Through cars loaded at factory for all accessible points.

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CUPOLA AND FURNACE LININGS,

Locomotive Tile, all kinds of Fire Clay Goods

AND

DOUBLE STRENGTH CULVERT PIPE.

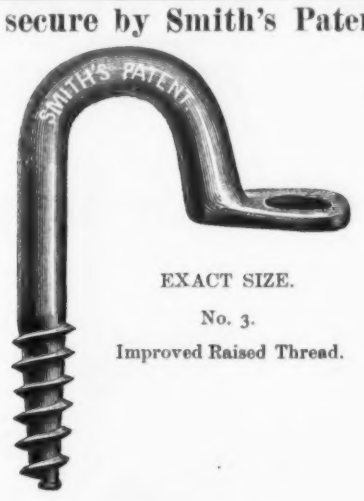
EVENS & HOWARD,

916 MARKET STREET, St. Louis, Mo.

Send for Prices and Freight Rates.

"A Good Padlock is made secure by Smith's Patent Screw Staples and Hasps."

EXACT SIZE.
No. 2.
Improved space "a."



EXACT SIZE.
No. 3.
Improved Raised Thread.

EXACT SIZE.
No. 4.
Improved General Dimensions.

CARD. CHICAGO, July 11, 1883.

From this date, the **Exclusive Manufacture and Sales** of Smith's Patent Screw Staples and Hasps, in and for the United States, will be carried on by the

WHEELING HINGE Co., of WHEELING, W. VA.

GRANGER SMITH, Patentee.

TO OUR CUSTOMERS AND THE TRADE GENERALLY:

The undersigned, constituting the firm of Smith Bros. Mfg. Co., desire to state that, in view of the increase and detail incident to their Hasp and Staple enterprise, and the fact of each being engaged in long-established and lucrative business, ENTIRELY FOREIGN TO HARDWARE, we have found it expedient to place the former business in its proper channels of manufacture, enabling it thus to be vigorously carried on, and in a manner better subserving the interests of the trade. Owing to the arrangements referred to our very satisfactory relations in the past with Messrs. Dodman & Burke will be necessarily severed.

SMITH BROS. MFG. CO. { GRANGER SMITH, of Granger Smith & Co., Chicago. / EDW. B. SMITH, of Smith & Davis, Buffalo.

WHEELING HINGE Co., Wheeling, W. Va., Sole Licensees in and for the United States of America.

FRANCIS LEY, VULCAN IRON WORKS, Derby, Eng., Sole Licensees in and for Great Britain and Ireland.

HAMILTON INDUST. WORKS, Hamilton, Sole Licensees in and for the Dominion of Canada.

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Hibbard, Spencer, Bartlett & Co., Chicago.
Edwin Hunt's Sons, "
Seeberger, Breakey & Co., "
Keith, Benham & Dezendorf, "
Markley, Alling & Co., "
Wells & Nellegar, "
Kellogg, Johnson & Bliss, "
Orr & Lockett, "
Hodge & Homer, "
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Buhl, Sons & Co., Detroit, Mich.
Ducharme, Fletcher & Co., Detroit, Mich.
Standart Bros., Detroit, Mich.
Lockwood, Van Dorn & Taylor, Cleveland, Ohio.
W. Bingham & Co., "
McIntosh, Good & Huntington, "
Pratt & Co., Buffalo, N. Y.
Weed & Co., "
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Kennedy, Spaulding & Co., Syracuse, N. Y.
French, Kincaid & Co., Utica, N. Y.
Simmons Hardware Co., St. Louis, Mo.
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Caruth & Byrnes Hardware Co., St. Louis, Mo.
Witte Hardware Co., St. Louis, Mo.
Chas. Humes & Co., "
Morgan & Beach, Fort Wayne, Ind.
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Lee, Fried & Co., Omaha.
Shultz & Hosea, St. Joseph, Mo.
Howell Gano & Co., Cincinnati, Ohio.
T. & A. Pickering, "
Patterson, Callendar & Co., Dayton, Ohio.
J. M. Warren & Co., Troy, N. Y.
Maurice E. Viele, Albany, N. Y.
Hawley Bros. Hdw. Co., San Francisco, Cal.
Huntington, Hopkins & Co., "
Russell & Erwin Mfg. Co., New York City.
Louderback, Gilbert & Co., "
F. R. Emmons & Bro., "
W. H. Goldey, New York City.
S. G. B. Cook & Co., Baltimore, Md.
Lloyd, Supplee & Walton, Philadelphia, Pa.
Buehler, Bonbright & Co., "
Russell & Erwin Mfg. Co., "
J. G. Brenner, Son & Co., "
Smith, Seltzer & Co., "
Wolff, Lane & Co., Pittsburgh, Pa.
Farwell, Ozmunn & Jackson, St. Paul, Minn.
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And other Leading Dealers.

PATENT ADJUSTABLE SOLDERING IRONS.

The only adjustable Soldering Iron combining perfect utility and simplicity of construction. Having no weak or complicated parts, it will outlast any other iron in the market. It has been subjected to the most severe tests, and in every case has given perfect satisfaction. From among the many favorable testimonials we have received, we publish the following:

WATERVLIET ARSENAL, WEST TROY, N. Y., June 9th, 1883.

The Covert Manufacturing Co., West Troy, N. Y.:

GENTLEMEN—I will state for your information that the Tinners' Soldering Tool, left at your request at this Arsenal last month for trial, has been thoroughly tested by the tinner employed here. It has been found superior to the soldering iron in common use, in that the copper tip is pivoted to the iron handle instead of being rigidly fastened thereto, and can be readily turned, so that it may form any angle with the handle that the workman may desire. With the soldering tool in common use the change in relative position of tip and handle can be made only by heating and bending the handle. Respectfully, your obedient servant,

A. MORDECAI, Lieut.-Col. of Ordnance, Commanding.

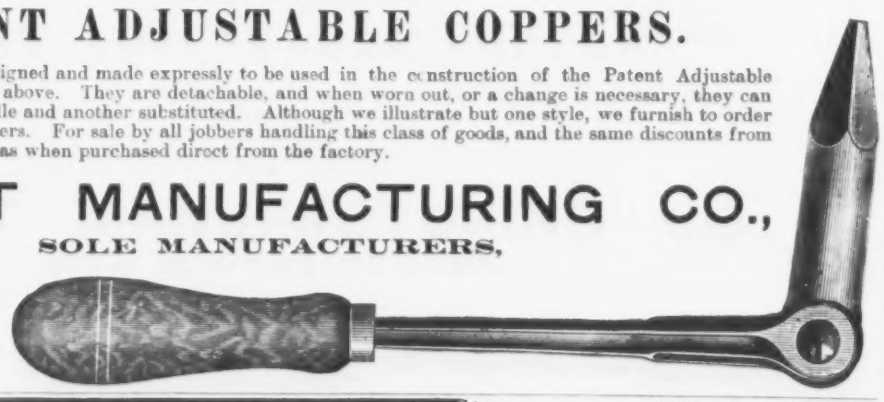
PATENT ADJUSTABLE COPPERS.

These Coppers are designed and made expressly to be used in the construction of the Patent Adjustable Soldering Irons, described above. They are detachable, and when worn out, or a change is necessary, they can be removed from the handle and another substituted. Although we illustrate but one style, we furnish to order all sizes and styles of coppers. For sale by all jobbers handling this class of goods, and the same discounts from the list given to the trade as when purchased direct from the factory.

COVERT MANUFACTURING CO.,

SOLE MANUFACTURERS,

WEST TROY, N. Y.



GARRY IRON ROOFING COMPANY

Largest manufacturers of Iron Roofing in the world. Manufacturers of all kinds of

IRON ROOFING

Crimped and Corrugated Siding, Iron Tile or Shingle, Fire-Proof Doors, Shutters, &c

IRON ORE PAINT AND CEMENT.

152-158 MERWIN STREET, CLEVELAND, O.

Send for Circular and Price List No. 9.

WM ESTERBROOK,

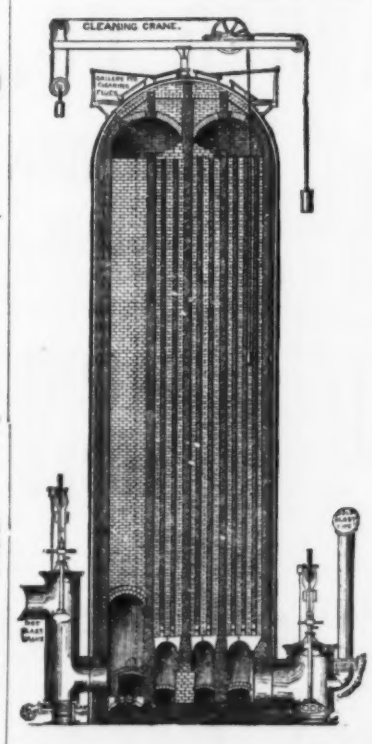
Wholesale Manufacturer of

Coal Hods,

311 Cherry St., PHILADELPHIA.

WITHEROW & GORDON,

ENGINEERS.

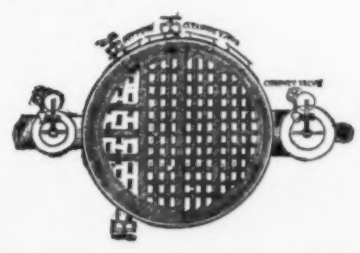


Whitwell Fire-Brick

HOT-BLAST STOVES

Contract for erecting the same. Also, for Building and Replacing all types of Blast Furnaces. Combining Economy with Efficiency and Modern Improvements, wherein the output of Furnaces is increased fully 50 per cent. and the fuel consumption decreased in the same ratio.

Our Blast Engines, Hoisting Engines, &c., have no superior in strength of parts, duty or economy. We solicit an opportunity to make proposals on Blast Furnaces, Rolling Mill or Steel Works Machinery.



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WORKS, NEW ASTLE, PA.

"BEST OF ALL."

THE ECLIPSE DAMPER.

Preferred by Jobbers.

Packed three dozen in a case.

Dealers Will Buy No Others AFTER ONE TRIAL.

Finest Go ds. Smoothest Castings.

WITH NICKEL PLATED HANDLE.

The Easiest Selling Damper. Most Attractive to Customers.

Insist upon your Jobber sending you this Damper only.

PRICE LIST PER DOZEN.

4, 4¼ and 5 in	$1.25 per doz	6 in	$1.50 per doz.
5½ in	1.38 "	7 in	2.00 "
5¾ in	1.50 "	8 in	2.75 "

Sold by the Leading Wholesale Houses everywhere.

CHARLES MILLAR & SON,

SOLE MANUFACTURERS.

Order Early. UTICA, N. Y.

The "Little Wonder" Injector.

Most reliable & cheapest in market.

Boiler Feeder.

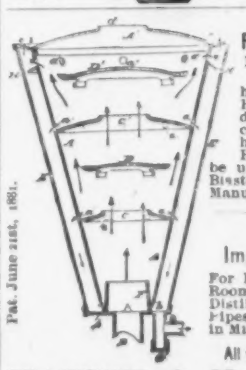
Pat. Oct. 2nd, 1878.

WATSON'S STEAM PRESSURE R GULATOR.

For reducing and giving an even pressure, regardless of pressure on Boilers.

For Paper Mills, Heating Apparatus, Sugar Refineries, &c.

(Pat. Aug. 9th, 1881.)



Pat. June 21st, 1881.

McDANIEL'S

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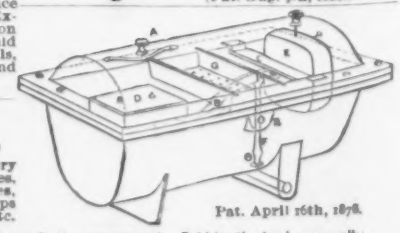
For Exhaust Steam Pipes.

Utilize the water of Exhaust Steam. Save your Roofs by keeping them dry, and avoid the nuisance created by Spray from Exhaust Pipes Blowing on Pavements, &c. It should be used by all Rolling Mills, Blast Furnaces, Breweries and Manufactories.

CHAPMAN'S

Improved Steam Trap.

For Heating Apparatus, Dry Rooms, Breweries, Factories, Distilleries, Sugar Houses, Pipes leading to Steam Pumps in Mines, Canning Houses, etc.



Pat. April 16th, 1878.

All the above sent on trial and satisfaction guaranteed. Sold by the trade generally.

WATSON & McDANIEL, 248 N. 8th St., Philadelphia.

The Iron Age Directory

And Index to Advertisements.

THE NEW BLAKE CRUSHER,

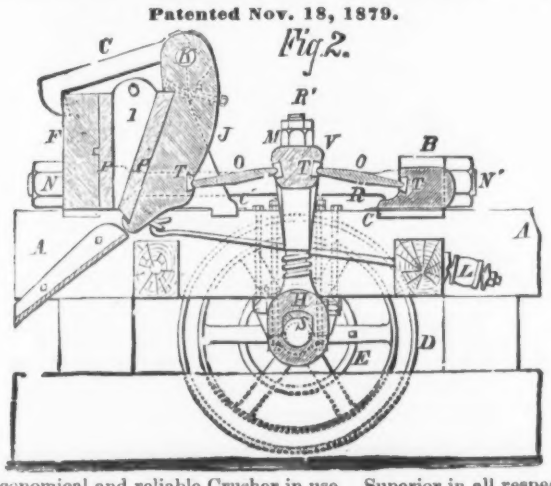
OR

BLAKE'S

CHALLENGE ROCK BREAKER.

Patented Nov. 18, 1879.

Fig 2.



The most economical and reliable Crusher in use. Superior in all respects to our old style Blake Crushers, and rapidly superseding them and all imitations. For railway ballast, Macadam road making, and crushing of ores of all kinds it has no competitor.

This machine dispenses with cast iron frame and pitman of our old forms. All strains are on wrought iron or steel.

Awarded medals of superiority by judges of American Institute Fair, New York City, 1879 and 1880, where it was exhibited in competition with our old forms of Crusher.

Address,

BLAKE CRUSHER CO.,

Sole Makers,

NEW HAVEN, CONN.

MONTGOMERY & CO.,

IMPORTERS

Stubs' Files, Tools and Steel, Grobet Swiss Files,

CHESTERMAN'S MEASURES,

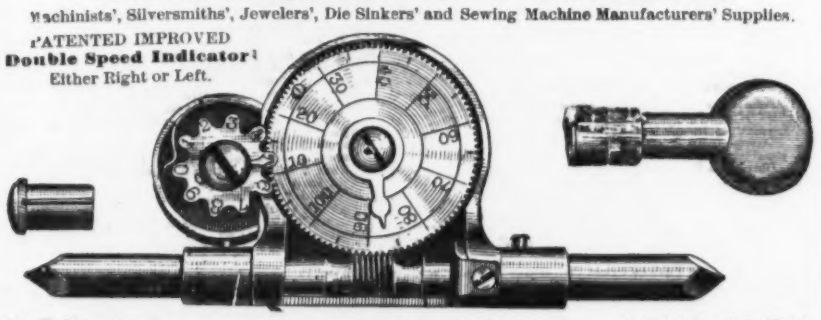
Hubert's French Emery Paper, Horseshoe Magnets, &c.

WM. SMITH & SON'S CELEBRATED MUSIC WIRE, Nos. 2 to 30

French Sheet Steel, 3 1-4 in. wide, from 4 to 65 thousandths.

Machinists', Silversmiths', Jewelers', Die Sinkers' and Sewing Machine Manufacturers' Supplies.

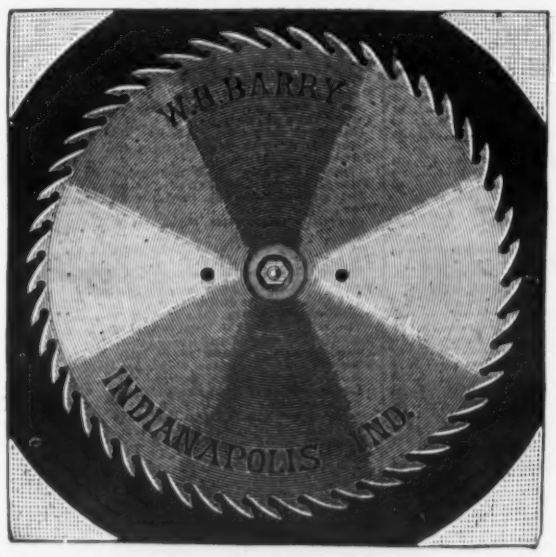
PATENTED IMPROVED
Double Speed Indicator
Either Right or Left.



GEO. W. MONTGOMERY.
GEO. W CHURCH.

105 Fulton St., NEW YORK

HOOSIER SAW WORKS.



W. B. BARRY,

Saw Manufacturer,

132 & 134

South Pennsylvania St.,

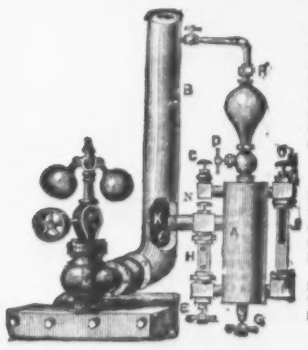
INDIANAPOLIS, IND

Swages, Gummers, Files, Belting and Emery Wheels.

ALL WORK FULLY WARRANTED.

THE DETROIT LUBRICATOR COMPANY'S

SIGHT FEED LUBRICATOR CUPS,



For oiling valves and cylinders of steam engines by the only perfect method, THROUGH THE STEAM PIPE. The oil passes IN SIGHT, drop by drop, into the column of steam, where it vaporizes, thus becoming a STEAM LUBRICANT, oiling perfectly every part reached by the steam. Any CLEAN OIL, black or white, light or heavy, may be used. Saves from 50 to 90 per cent. in oil and wear of machinery, thus paying for itself several times a year. A cup will be sent to responsible parties on twenty days' trial if desired. In ordering, give diameter of cylinder.

NOTICE.

The first Lubricators ever made showing the oil passing drop by drop through a transparent water chamber were devised by us, and the same are fully embraced by many Letters Patent owned and controlled by us, which have been sustained in several hotly-contested legal contests. Our customers therefore need have **NO fears in their purchase and use.**

Lubricators of every nature embodying the above feature made by other parties are encroachments upon our rights, and we will hold purchasers and users, as well as manufacturers, responsible in damages for such violation.

Address,

DETROIT LUBRICATOR CO.,

129 Griswold Street, DETROIT, MICH.

NOTE.—In our suit against the American Lubricator Co., of Detroit, before Justice Stanley Matthews, of the U. S. Supreme Court, involving their "Sight-feed" feature, a decree was rendered in our favor August 20, 1881.

Mention *The Iron Age*.

John T. Lewis & Bros.

No. 231 South Front St.

PHILADELPHIA.

JOHN T. LEWIS & BROS. WARRANTED PURE WHITE LEAD. PHILADA.

TRADE MARK.

MANUFACTURERS OF

Pure White Lead, Red Lead, Litharge, Orange Mineral, Linseed Oil,

AND PAINTERS' COLORS.

JOHN JEWETT & SONS

Manufacturers of the well-known brand

WHITE LEAD

JEWETT & SONS' PERFECTLY PURE WHITE LEAD.

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ALSO MANUFACTURERS OF

LINSEED OIL.

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ATLANTIC WHITE LEAD PURE WARRANTED ROBERT COLGATE & CO. TRADE MARK

The Atlantic White Lead and Linseed Oil Co.,

Manufacturers of

White Lead (Atlantic), Red Lead, Litharge, Glass Makers' Litharge and Orange Mineral;

LINSEED OIL.

Raw, Refined and Boiled.

ROBERT COLGATE & CO.,

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SALEM LEAD COMPANY,

CORRODERS AND MANUFACTURERS OF

PURE WHITE LEAD.

SALEM LEAD CO. 100 WARRANTED PURE SALEM, MASS.

ALSO MANUFACTURERS OF

Lead Pipe and Narrow Sheet Lead.

F. A. BROWN, Treas. SALEM, MASS.

"AUSTRIA" CLUB SKATE.

I carry in stock a complete line of all the prominent makes of Club Skates, Ladies' and Gents' Wood Tops, Straps, parts for repairs &c.

SELF-FASTENING BY STEPPING ON THE SKATE.

Brief mention is made of the following points in favor of the "**Austria.**" which tend to make it the most popular Club Skate now in use, viz., exceeding *simplicity* (there being but one screw in the skate, welded, hardened runners, solid steel clamps, &c. Can be adjusted more securely and quickly than any other skate, are far superior to any other patent for range of adjustment to either the smallest heel and narrowest toe, or the extreme opposite. Send for sample and price to **Wm. M. Cornwall** (Sole Agt.), 18 Warren St., New York. Orders executed at manufacturers' prices. Complete Price Lists on application.

T. NEW'S

Prepared

ROOFING

FOR STEEP OR FLAT ROOFS.

Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW, 39 John St., New York.

BARRETT, ARNOLD & KIMBALL, Western Agts.

CHICAGO, ILL.

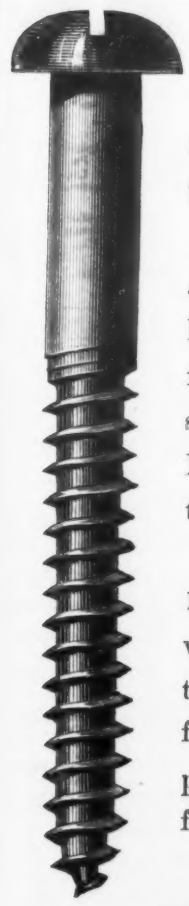
PHILADELPHIA SCREW CO., Limited

Twelfth and Buttonwood Sts., PHILADELPHIA,

MANUFACTURERS OF

IRON AND BRASS WOOD SCREWS

OF EVERY DESCRIPTION.



Quality, finish and tests as to strength guaranteed equal to any in the market.

Desiring to give the fullest advantage to our customers, we have withdrawn all our accounts from Commission Houses, and solicit direct correspondence from Dealers in all parts of the country.

Having placed an additional 100-Horse-Power Engine, and with otherwise improved facilities and largely increased capacity for production, we can fill orders promptly, and invite inquiries for discounts.

FULL LINE IN STOCK.

THE CELEBRATED

BUCKEYE LANTERNS.

BEST IN THE MARKET.

Elegantly Made.

STRONG.

HIGHLY POLISHED.

Hinged Tops and Bottoms.

Removable Globes.

Will Stand any Draft of Wind.

Free from Smoke.

Manufactured only by

Buckeye Lantern Co.

Bellaire, Ohio.

SEND FOR PRICES.

CAST STEEL RAKES, COKE FORKS AND GARDEN WEEDERS, MALLEABLE IRON RAKES,

AND ALL KINDS OF

FARMING TOOL HANDLES.

THE PIQUA HANDLE & M'F'G CO.,

PIQUA, OHIO, U. S. A.

THE

DEXTER CARRIAGE SPRING

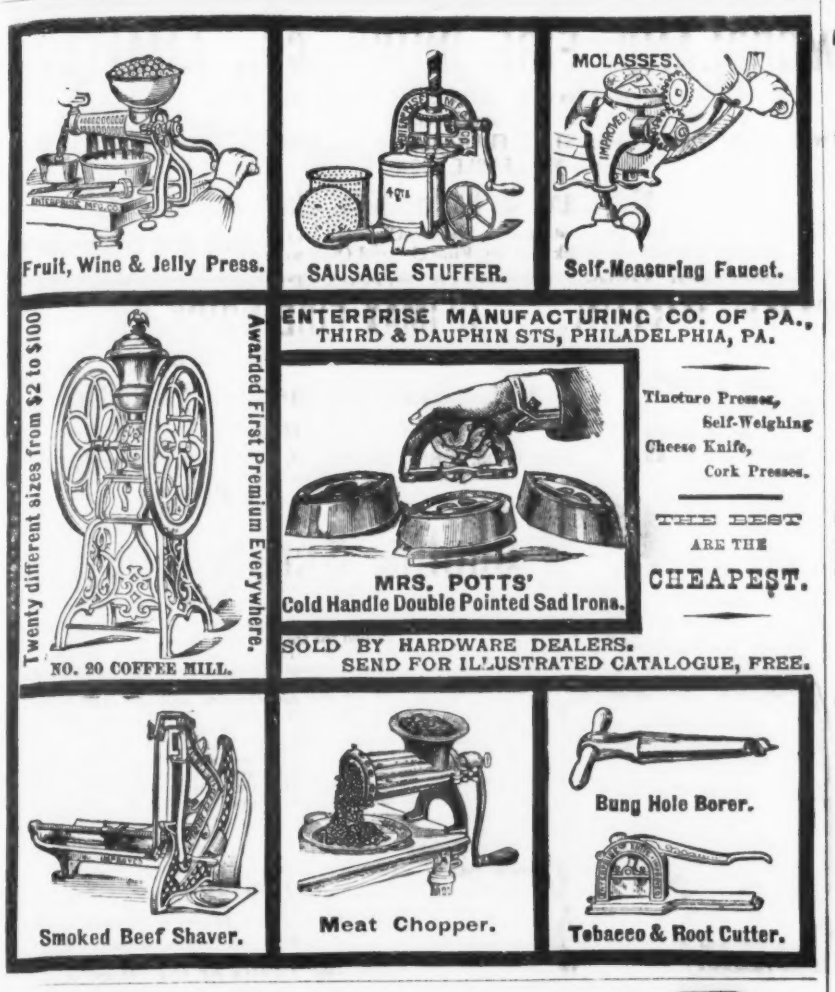
Combines Strength, Durability, Beauty.

It is Graceful, Noiseless, Light and Easy.

The DEXTER SPRING is the most perfect Carriage Spring ever invented. Wherever it is known it is rapidly superseding all others for pleasure vehicles. It is especially recommended for use on the rough roads of new countries, as its peculiar construction relieves the strain on the vehicle and shock to the passenger, while the high grade of material used reduces the probability of breakage to a minimum.

For circulars, prices, &c., address

DEXTER SPRING CO., Hulton, near Pittsburgh., Pa. U. S. A.



THE STANLEY WORKS,

MANUFACTURERS OF

Wrought Iron Butts, Hinges

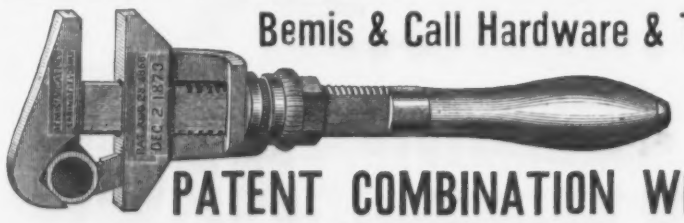
AND

DOOR BOLTS,

Plain, Japanned, Bronzed and Plated

FACTORIES: New Britain, Connecticut.

WAREHOUSE: 79 Chambers St., New York.



Bemis & Call Hardware & Tool Co.

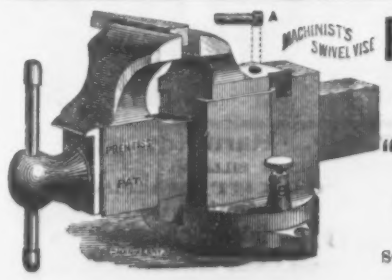
This Wrench can be furnished with Briggs' Pat. Nut or Sleeve

PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a combination which has no equal.

For Circulars and Price List, address

BEMIS & CALL HARDWARE & TOOL COMPANY, Springfield, Mass.



PRENTISS' PAT. VISES,

Adjustable Jaw.

Stationary or Pat. Swivel Bottoms.

ADAPTED TO ALL KINDS OF VISE WORK. ALSO

"PEERLESS" SWIVEL PIPE GRIP,

FITS ANY VISE. SOLD BY THE TRADE.

PRENTISS VISE CO.,

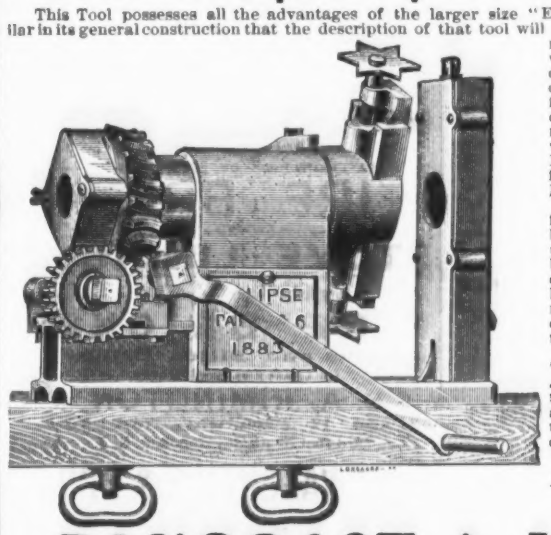
23 Dey Street, New York.

SOLE PROPRIETORS. SEND FOR CIRCULAR.

THE

"Junior" Eclipse Pipe-Cutting Machine

This Tool possesses all the advantages of the larger size "Eclipse" Machine, and is so similar in its general construction that the description of that tool will serve for the "Junior" also. It meets the requirements of those who have use for a Screwing Machine light enough to be readily carried about, sufficiently powerful in its gearing (18 to 1) to work easily, and strong enough to bear rough usage. All of these points, with the very important one of MODERATE COST, are to be found in the **"Junior" Eclipse Machine.**



It will cut off and thread Pipes from ⅛ to 2-inch, inclusive; can be erected on any fence, box or plank in five minutes by simply boring two ¾ holes, and weighs, complete, about 125 pounds. It has no complicated parts and nothing to break or get out of order, and will do the work of a tool costing twice its price.

We offer it, as also the large size "Eclipse" (cutting pipes 2½ to 4 inch), with the understanding that if not found satisfactory after a fair trial it may be returned to us within thirty days and the purchase money will be refunded.

PRICE, Complete with Dies 1-4 to 2 inches, $60.

PANCOAST & MAULE,

243 & 245 So. Third St., PHILADELPHIA.

Post's Waterproof Belt Oil and Leather Preservative,

FOR WET AND DRY LEATHER BELTING.

TRADE POST OIL MARK.

Registered in the U. S. and Great Britain.

Leather dressed with this oil will not crack or rot, as heat, cold, water or gas has no effect on it. It will spread one-third further and last much longer than any oil for the same purpose. It never turns rancid: will keep in any climate. Belts may be run in water at one end and a hot room at the other, and still be soft, dry and pliable. Warranted not to start glue laps or gum on belts or pulleys, and to keep the surface perfectly smooth. **Beware of Imitations Sold at a Cheaper Price, the Color of which is well Calculated to Deceive.**

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J. & H. Phillips, Pittsburgh, Pa.
J. B. Farnum, Woonsocket, R. I.
G. D. Barr, Buffalo, N. Y.
E. B. Preston & Co., Minneapolis, Minn.
Post & Co., Cincinnati, O.
I. B. Williams & Sons, Dover, N. H.
J. B. Hoyt & Co., Chicago, Ill.
Langlois & Son, Racine, Wis.
Laurence & Herkner, New York.
J. Le Roy Pine, Troy, N. Y.
Brown Bros. & Co., Providence, R. I.
Jas. H. Billington & Co., Phila., Pa.
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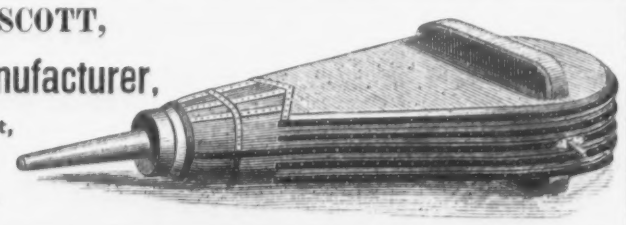

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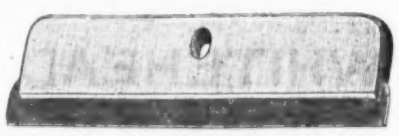

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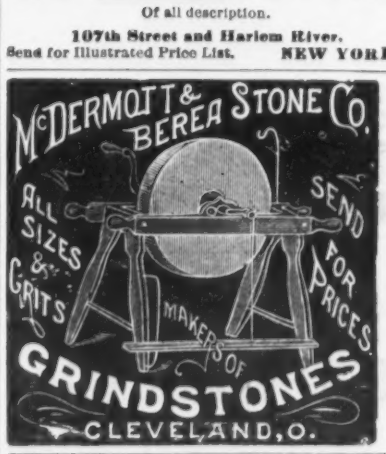

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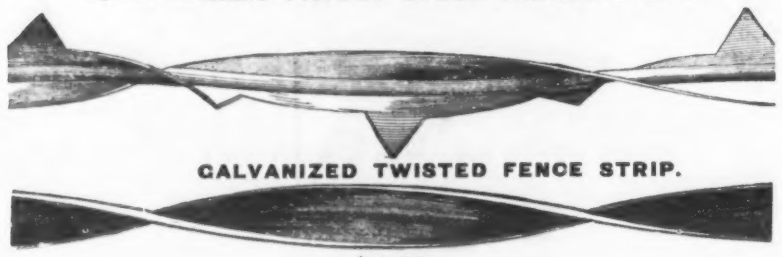

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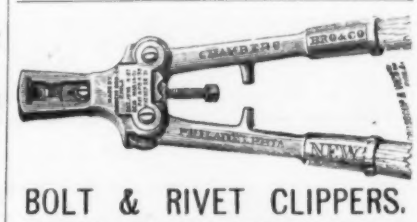

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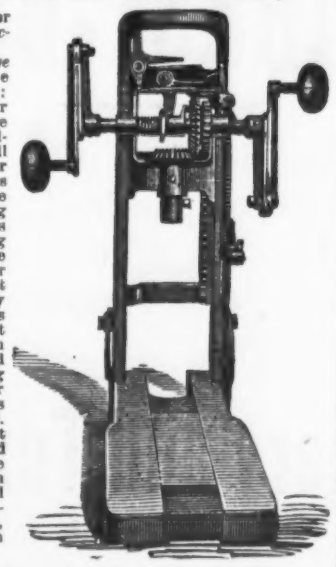

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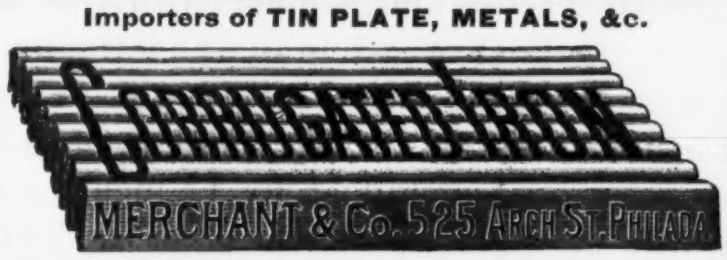

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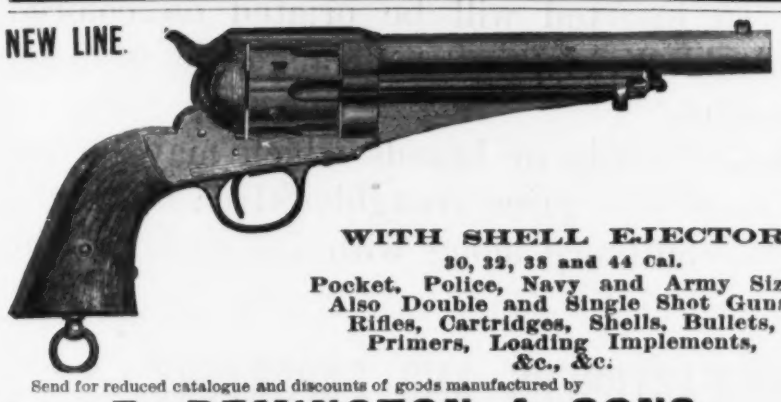

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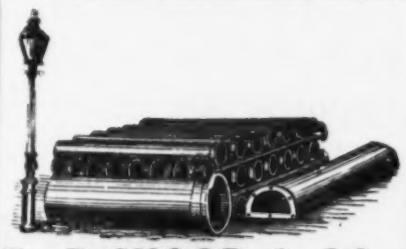

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PRINCIPAL AGENTS.

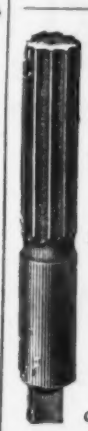
Markley, Alling & Co., Chicago; Ducharme, Fletcher & Co., Detroit, Mich.; Burger & Baumgard, New York City; Lloyd, Supplee & Walton, Philadelphia, Pa.; Buchler, Bombright & Co., Philadelphia, Pa.; Samuel C. B. Cook & Co., Baltimore, Md.; Bindley Hardware Co., Pittsburgh, Pa.; A. F. Shapleigh & Cantwell Hardware Co., St. Louis, Mo.; Farwell, Ozmun & Jackson, St. Paul, Minn.; Howell, Gano & Co., Cincinnati, O.; Pappenheimer Hardware Co., Cincinnati, O.; Hall & Willes Hardware Co., Kansas City, Mo.; Pratt & Co. Buffalo, N. Y.; Seeberger, Breakey & Co., Chicago, Ill.; H. O. Stratton, Boston, Mass.; Shulz & Hosen, St. Joseph, Mo.; Wyeth Hardware Co., St. Joseph, Mo.; A. Baldwin & Co., New Orleans, La.; Gorden Hardware Co., San Francisco, Cal.; Kilbourn, Jones & Co., Columbus, O.; Morley Bros., East Saginaw, Mich.; W. B. Belknap & Co., Louisville, Ky.

We are also extensive manufacturers of **Fruit Can Sealing Wax.** Send for Circulars and Prices.

Very Respectfully,

THE AMERICAN BOLT & SCREW CASE CO.

MORSE TWIST DRILL AND MACHINE CO.
NEW BEDFORD, MASS., Sole Manufacturers of
Morse Patent Straight-Lip Increase Twist Drill,
Beach's Patent Self-Centering Chuck, Solid and Shell Reamers,
BIT STOCK DRILLS,



DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL PRESSES. BEACH'S PATENT SELF-CENTERING CHUCKS, CENTER AND ADJUSTABLE DRILL CHUCKS, SOLID AND SHELL REAMERS. DRILL GRINDING MACHINES. TAPER REAMERS, MILLING CUTTERS AND SPECIAL TOOLS TO ORDER.

All Tools exact to Whitworth Standard Gauges.

GEO. R. STETSON, Supt. EDWARD S. TABER, Treas.

BEECHER & PECK
Successors to Milo Peck, Manufacturers of

PECKS DROP PRESS

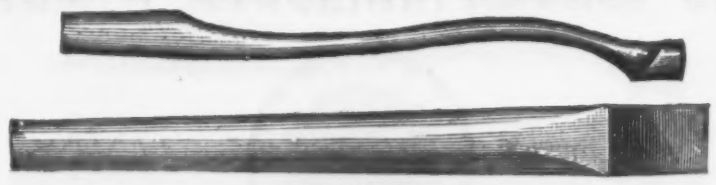
PECK'S DROP LIFTER is the only one which has its parts cushioned. Being thus cushioned they are the most durable Lifter in the market.

Can be attached to any drop now in use.

Send for Illustrated Catalogue.

Cor. Lloyd and River Sts. **New Haven, Conn.**

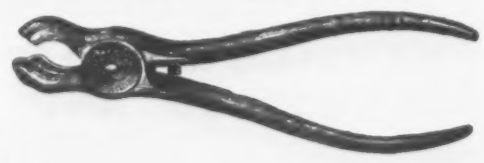
V. G. HUNDLEY,
PROPRIETOR OF
NORTH CAROLINA HANDLE CO.



MANUFACTURER OF
Handles and Spokes,
79 Reade Street and 97 Chambers Street, - - - - NEW YORK.
HARDWARE COMMISSION MERCHANT.

BLAIR'S PATENT BOSS HOG AND PIG RINGER.
Will close almost all kinds wire rings. The most economical to buy, to sell and to use.

Fruit Jar Caps and Wires, ½ gross in box; price, per gross, 65 cents.



MANUFACTURED BY

E. BLAIR, Bucyrus, Ohio.

PHILADELPHIA.

Corrected Weekly by Lloyd, Supplee & Walton.

Terms, 30 days. For 60 or 90 days, interest added at 10% per cent. per annum.

Anvils.
Peter Wrights, ₩ ℔.....11 @ 11½c
Over 200 lbs.....11¼c
Trenton.....10½
Eagle Anvils, American, 100.....dis 20 %

Apple Parers.
Globe Apple Pearers.....$5.50 net
Penn Apple Parers.....$6.50 net
Lots of 10 to 25 dozen special prices

Axes.
Hunt's Kentucky and Yankee, per doz $8.50 @ 9.00
Robert Mann.....$8.00 @ 8.50
Richlang Chief.....$7 50 @ 8.00
Beveled Axes.....and 50c net
Double Bit Axes.....net $14.40 @ 15.40

Augers and Auger Bits.—New List January 7, 1880.
Bates' Nut Augers.....dis 50@55 %
Cook's Augers.....dis 40&10 %
Watrous' Ship Augers.....dis 15 %
Benjamin Pierce Auger Bits.....dis 40 %
Griswold Auger Bits.....dis 50@55 %
Cook's " .....dis 40&10 %
Jennings' " .....dis 10, 10&10 %
Bonney's Pat. Hol. Augers, list $48 ₩ doz..dis 25&10 %
Stearns' Pat. Hol. Augers, list $48 ₩ doz..dis 20&10 %

Balances.
Light and Common.....dis 33⅓ %

Bells.
Bevin Bros. Mfg. Co. Light Hand Bells.....dis 70 %
Swiss Pattern Hand Bells.....60 %
Connell's Door Bells.....dis 15&10
Gt. Western & Kentucky Cow new list.....dis 60

Boring Machines
Upright, without Augers.....List 5.50 } dis 15@10 %
Angular, without Augers....." 6.75 }

Bolts.—Eastern Carriage Bolts.....dis 80&10 %
Philadelphia " ....new list dis 70&10 %
Stanley, Wrought Shutter.....dis 50&10 %

Braces.—Barber's.....dis 40&5 %
Backus.....dis 50 %
Spofford.....dis 50&5 %
American Ball.....dis 55 %

Butts.—Cast Fast Joint, Narrow.....dis 45&10&10 %
" " Broad.....dis 45&10&10 %
Cast Loose Joint, Narrow.....dis 55&10&10 %
" " Broad.....dis 45&10&10 %
" Acorn. Loose Pin.....dis 50&10&10 %
" " " Jap'd.....dis 60&10&10 %
" Mayer's Loose Joint.....dis 60&10&10 %
Wrought Loose Pin.....dis 55&10 %
" Table Hinges and Back Flaps...dis 50&10 %
" Narrow. Fast.....dis 50&10 %
" Loose Joint.....dis 55&10 %

Blind Butts.
Parker.....dis 70&2 %
Clark.....dis 70&2 %
Shepard.....dis 70 %
Lutt & Porter.....dis 74&10 %
Huffer's.....dis 50 %

Chains.—German Halter and Coil. list December 31 1881.....dis 50@55 %
Galvanized Pump.....₩ ℔ 9½c net
Best Proof Coil Chain—English.

₩ ℔	¼	5-16	⅜	7-16	½
	12	8¾	7¼	6¼	6	5¾	gold.
	4-18	¼	5-16	⅜	7-16	½	in.

Chisels.—Socket Framing.....dis 65&10 %
Socket Firmer.....dis 65&10 %
Butcher's.....$8.00@$5.25 to £ gold

Casters.—Bed (new list July 1, 1880).....dis 45@50 %
Plate.....dis 45@50 %

Coffee Mills.—Box and Side, new list Jan. 1. 1880.....dis 50 %
Enterprise.....dis 25 %

Cutlery.—Walden Pocket.....new list net
Penna. Knife Co.....new list net
Landers, Frary & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net.

Drawing Knives.
Hart Mfg. Co.'s.....dis 65&10 %
Adjustable Handle.....dis 20 %

Dry Pans.
Tinned.....dis 45 %

₩ doz.	$3.50	4.00	4.50	5.00	5.50	6.50	7.50	9.00	10.00
No.	0	1	2	3	4	5	6		8

Burnished.....dis 60, 10 & 5 %

₩ doz.	$3.00	3.75	4.25	4.75	5.25	6.00	7.00	8.00	9.00
Fo.	0	1	2	3	4	5	6	7	8

Files.
Nicholson.....dis 45 %
Disston.....dis 45 %
Butcher.....

Fluting Machines.
Eagle—3½ in. roll.....each, $2.15 } dis 35 %
" —4½ in. roll....." 2.85 }
Crown—4½ in. roll....." 3.50 }
" —6 in. roll....." 4.00 } dis 35 %
" —8 in. roll....." 6.50 }
Geneva Fluter.....dis 25 %
Favorite corn Fluter & Sad Iron.....₩ doz $10.50 net

Hammers.
Yerkes & Plumb's, new list.....dis 30 %
Maydole Hammers.....dis 15 %
Howell A. E. Nail Hammers,.....per doz. net $3.75

Handles.
Disston Loop Handles Crosscut.....33c pair net
Boynton Loop Handles Crosscut.....33c pair net

Hatchets.
Yerkes & Plumb, new list.....dis 30 %
Hunt.....dis 25 %

Hinges.
Strap and T.....dis60&10&2 %

Horse Nails.

Nos.	5	6	7	8	9	10	
Globe	24	21	19	18	17	16	dis 12½ %
Vulcan	26	23	21	20	19	18	dis 12½ %
Ausable	30	27	25	24	23	22	dis 30&10 %

" Polished and P't'd & Blued & P't'd..31 28 26 25 24 23 dis 30&10%
Clinton.....24 21 20 19 18 dis 30&10%
" Polished & Pointed.24 22 21 20 19 dis 30&10%

Hay and Straw Knives.
Lightning.....per doz, net $18.00
Electric....." " 18.00
Wadsworth....." " 10.40
Walton Straw Knives....." " 17.00

Locks and Knobs.
Branford.....new list dis 50&2 % cash
Gaylord Cabinet.....dis 4 %
American Padlocks.....dis 30, 10&2 % cash
Scandinavian Padlocks.....dis 50 %

₩ doz.	$5.00	5.50	6.50	7.50	8.50	10.00	12.50	} dis 60 %
No.	57	58	59	60	61	62	63	
₩ doz.			$18.00		26.00		33.00	} dis 60 %
No.			64		65		66	

Lanterns.
Buckeye.....Large list net; small list net
Tubular.....No. 0, $7.50; No. 1, $9.00 ₩ doz net
Guards, 40cents extra.

Lawn Mowers.—Pennsylvania.....} new list
Philadelphia " .....} dis 30 %
Excelsior.....}

Lawn and Garden Pumps.
Roland Patent.....List $5.00 dis 10 %

Matlocks.
Long and Short Cutter.....new list....50 %
Pennsylvania Pattern.....dis 50 %

Molasses Gates.
Enterprise Mfg Co.'s Measuring Faucets.....dis 5 %
Stebbins' Gates.....dis 70&10%
Lincoln's " .....dis 60&10 %
Landers, Frary & Clark's Petroleum.....dis 20&10 %
Brass Liquor Cocks, new list Jan. 1 1880.....dis 45 %
Cork Lined " .....dis 70 %

Meat Cutters.
Dixon's.....dis 25&5 %
Woodruff.....dis 25&5 %
Stowe.....dis 25&5 %
Hale's.....new list, dis 40, 10&2 cash
American.....dis 20&10 %
Stuffers.....dis 25&5 %
Enterprise Stuffers.....dis 25 %

Planes.—Sandusky Tool Co.....dis 20 %
Ogonts.....dis 25 %
Ohio & Auburn.....dis 20 %
Bailey (S. R. & L. Co.).....dis 20&10 %

Plane Irons.—Ohio Tool Co.....dis 20&10 %
Butcher's.....$4.00@$5.25 to £

Plumbs and Levels.
Stanley's Adjustable.....dis 65&10 %
" Non-Adjustable.....dis 65&10 %

Picks.—New list.....50 %

Razor Strops.
Lamont Combination.....per doz. $4.00
" .....1 gross lots $42.00
Imitation Emerson.....per doz. 2.00

Rules.—Stanley Boxwood.....dis 70 & 10 %
Stanley Ivory.....dis 65&10 %

Steelyards.—Hart's Pattern.....dis 40&10 %

₩ doz.	$14.50	17.75	21 00	26.50	31 00	35.50
Lbs	50	100	150	200	250	300

American Pattern.....dis 40&10 %

₩ doz.	$8.00	10.25	13.75	15.00	16.75	19.50
Lbs.	50	100	150	200	250	300

Squares.
Steel and Iron...dis 50 ; full case. dis 50&10&2 for cash
Try Squares, Stanley.....dis 60&10 %
Disston's Try Squares.....dis 40 %

Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened.....₩ doz $9.00
Clipper No. 10, Bronzed Blade, Boxed and Sharpened.....₩ doz $8.50 } 30
Clipper No. 5, Painted Red, Boxed and Sharpened.....₩ doz $8.00

Saws.—Disston's Hand, Panel and Rip.....dis 20 %
Disston's Circular.....dis 40 %
Cross-Cut No. 2, Plain Tooth.....dis 40%
" " Patent Tooth.....dis 40%
" " Champion Tooth.....dis 40%
Boynton's Lightning Cross Cut, new list.....dis 40 %
" Lightning Buck Saws, cross bar...dis 40 %

Shovels and Spades.
Oliver Ames & Sons, new list.....dis 15 %
Griffiths.....dis 50@50&5
Rowland.....dis 50@50&5

Sad Irons.—4 to 10 lbs.....₩ ℔ 3½c
Mrs. Potts' Patent.....dis 35 %

Stone.
Washita Extra.....₩ ℔ 23½
" No. 1....." 15c
" No. 2....." 10c
" Slips....." 37c
" Axe....." 130 net
Hindostan Oil Stone No. 1.....₩ ℔ 8c } dis 33⅓ %
" Axe Stone....." 8c }
" Slips....." 10c }

Screws.
Flat Head Iron, new list Dec. 27.....dis 45 %
Flat Head Brass, new list Dec. 27.....dis 55 %
Round Head Brass, new list Dec. 27.....dis. 40 & 10 %
Round Head Iron, new list Dec. 27.....dis. 45 & 10 %

Spoons.
Plated.....dis 45 & 10&5 %
German Silver.....dis 30&10&5 %
Britannia, Boardman's.....dis 60&10 %
" Parker's.....dis 50&10 %
Tinned.....dis 10 %

Springs.—Torrey.....dis 50 %
Gem No. 3 small Jap'd.....$2.00 } dis 50 & 10 %
" No. 2 medium Jap'd.....2.75 }
Coil No. 70, per gross net.....$6.00
Other Standard Springs.....dis 60&10 %
Warner Door Springs, per doz. net.....1.75
Standard Spring Hinges—
Single No. 0, per doz. net.....1.25
" No. 1, " " 1.50
Other Standard Spring Hinges.....dis 25&10 %

Stocks and Dies......dis 10&5 %

Stove Polish.—Gem.....₩ gross, $1.50, dis 5 %
Dixon.....per 6.00, dis 10%
Fire Fly.....$3.00 gross net

Tacks......dis 30&10 %

Shoe Nails.—8, and over 8c..... } 10 %
" " 3½-8, and under 90 ..... }
Double Pointed Tacks.....dis 30&5 %

Traps.
Genuine Oneida—Newhouse.....dis 35 %
Im. Oneida—Newhouse list, first qual dis 55&5 @ 60 %

Vises.—Solid Box. Trenton new list.....dis 35 %

Wrenches.—Agricultural.....dis 70 %
Coes' Genuine.....dis. 50&10&3 %
Coes' Mechanics'.....dis. 50&10&3 %
" " Mall. Bar.....dis 75 %

Wire.
Bright or Ann'd, No. 0 to 18.....dis 57½@60 %
" No 19 to 26.....dis 60@65 %
" " No. 27 to 36.....dis 62½@70 %
Coppered, 0 to 18.....dis 50@50½ %
Tinned Broom Wire.....dis 57½@60 %
Galvanized Barb Wire.....7½c
Painted Barb Wire.....6½c
Galvanized No. 7 to 18....Market List, dis 15@17½ %

Wringers.
Peerless No. 2½.....$12.00
" No. 3.....45.00
Universal No. 2½.....42.00
" No. 2.....45.00
Novelty No. 2, for common tubs.....42 00
" No 3, " " 48.00
Excelsior E, for stationary tubs,.....51.00
" F " " 57 00

In lots of 1 doz. $3.00 doz. dis. from above price.

PITTSBURGH.

Merchant Iron.

TERMS.—Note or acceptance at 60 days, with current rate of exchange on New York, or a discount of 2 per cent. for cash, if remitted within 10 days from date of invoice.

For fluctuations and discounts on card rates see weekly Pittsburgh Trade Report.

The following are card rates.

Flat Bar.

1¼ to 4 by ⅜ to 1 inch.....2.50
4¼ to 6 by ⅜ to 1 " 2.60
1¼ to 6 by 1¼ to 1½ " 2.90
1¼ and 1¾ by ⅜ to ¾ " 2.60
1 and 1¼ by ⅜ to ¾ " 2.70
1¼, ¾ and ⅞ by ⅜ to ¾ inch.....2.90

Rounds and Squares.

1 to 1¾.....2.50
2 to 2¾.....2.70
2¾ to 3¼.....3.00
3¼ to 4.....3.90
4¼ to 5.....4.00
⅝ to ⅞.....2.80
Oval Iron.
⅞ to 1¼.....2.90
⅝ to ¾.....3.10

Half Oval and Half Round.

⅞ to 1¼ inch.....3.20
⅝ to ¾ " 3.70

Horse Shoe.

⅝ to 1¼ by 5-16 to ¾ inch.....3.50

Wagon Box Iron.

¾ Inch. Nos. 13 and 14.....3.70
⅝ " " 11 and 12.....3.50
⅝ " " 13 and 14.....4.00
⅝ " " 11 and 12.....3.80
⅝ " " 13 and 14.....4.40
⅝ " " 11 and 12.....4.10

Heavy Bands.

3½ to 6 by ¼ and 5-16 inch.....2.70
1¾ to 3¼ by ¼ and 5-16 " 2.70
1 to 1¾ by ¼ and 5-16 " 2.80
¾ to ⅞ by ¼ and 5-16 " 4.00
⅝ and ⅜ by ¼ and 5-16 " 3.90

Light Bands.

1¼ to 6 by ⅛ to3-16.....3.00
1¼ to 6 by Nos. 11 and 12.....3.10
1¼ to 1¾ by ¼ to 3-16.....3.10
1 to 1¾ by Nos. 11 and 12.....3.20
⅞ and 13-16 by ⅛ to 3-16.....3.40
⅞ and 13-16 by Nos. 11 and 12.....3.50
⅝ and 11-16 by ⅛ to 3-16.....3.70
⅝ and 11-16 by Nos. 11 and 12.....3.80
⅝ and 9-16 by ⅛ to 3 16.....4.00
⅝ and 9-16 by Nos. 11and 12.....4.10
⅝ inch by ⅛ and 3-16.....4.30
⅝ inch by Nos 11 and 12.....4.40

Hoop Iron.

1¼ to 4, Nos. 13, 14 and 15.....3.30
1¼ to 2, Nos. 16, 17 and 18.....3.40
1¼ to2, No. 19.....3.50
1¼ to 2, No. 20.....3.60
1¼ to 2, No. 21.....3.70
1¼ to 2, No. 22.....3.80
15-16 I, and 1¼, Nos. 13, 14 and 15.....3.50
15-16, 1. and 1¼, Nos. 16, 17 and 18.....3.60
15-16, 1. and 1¼, Nos. 19 and 20.....3.70
15-16, 1, and 1¼, No. 21.....3.80
15-16, 1, and 1¼, No. 22.....3.90
⅝, Nos. 13, 14 and 15.....3.70
⅝, Nos. 16, 17 and 18.....3.80
⅝, Nos. 19 and 20.....3.90
⅝, No. 21.....4.00
⅝, No. 22.....4.00
13-16, Nos. 13, 14 and 15.....3.90
13-16, Nos. 16, 17 and 18.....4.00
13-16, Nos. 19 and 20.....4.10
13-16, No 21.....4.20
13-16, No. 22.....4.30
¾, Nos. 13, 14 and 15.....4.00
¾, Nos. 16, 17 and 18.....4.10
¾, Nos. 19 and 20.....4.30
¾, No. 21.....4.30
¾, No. 22.....4.40
11-16, Nos. 13, 14 and 15.....4.30
11-16, Nos. 16, 17 and 18.....4.30
11-16, Nos. 19 and 20.....4.40
11-16, No. 21.....4.50
11-16, No. 22.....4.60
⅝, Nos. 13, 14 and 15.....4.40
⅝, Nos. 16, 17 and 18.....4.50
⅝, Nos. 19 and 20.....4.60
⅝, No. 21.....4.70
⅝, No. 22.....4.80
⅝, No. 23.....4.90
9-16, Nos. 13, 14 and 15.....4.60
9-16, Nos. 16, 17 and 18.....4.70
9-16, Nos. 19 and 20.....4.80
9-16, No. 21.....4.90
9 16, No. 22.....5.00
9-16, No. 23.....5.10
⅛ inch, Nos. 13, 14 and 15.....4.80
⅛ " Nos. 16, 17 and 18.....4.90
⅛ " Nos. 19 and 20.....5.10
⅛ " No. 21.....5.20
⅛ " No. 22.....5.30
⅛ " No. 23.....5.40

The prices under Hoop Iron do not apply to Cotton Ties.

1-10c per lb. extra will be charged for each gauge lighter than the lightest indicated.

1-10c per lb. extra will be charged for cutting Hoops to specified lengths.

Barrel Hoops.

1¼ to 2 in., cut to length

9 to 11 lbs, per set of 6 hoops.....3.50
8 lbs. and less than 9 lbs. per set of 6 hoops.....3.00
Less than lbs. per set of 6 hoops.....2.80

Extras for Cutting to Length all Preceding Iron.

All Iron, including Tire.....1.100

Tank Iron.

No. 9 and heavier.....3.30
Plow Slabs.....3.40
" Wings.....3.80

Sheet Iron.

	Common.	Charcoal.	Juniata.
No. 10 to 14	3.40	4.00	6.40
No. 15 to 17	3.80	4.30	6.80
No. 18 to 21	4.10	4.80	7.10
No. 22 to 24	4.30	4.80	7.30
No. 25 & 26	4.40	5.00	7.40
No. 27	4.70	5.20	7.70
No. 28	5.10	5.50	8.10

All sheets No. 18 and lighter, over 30 inches wide, not less than 2.10c extra.

Wood's Patent Planished Sheet.

1st quality (A).....10½c | 2d quality (B).....9 c

Galvanized C. H. B.—Charcoal Hammered Blooms.

Nos. 14 to 20	12c	No. 27	15c
Nos. 21 to 24	13c	No. 28	16c
Nos. 25 and 26	14c	No. 29	18c

45 @ 47½ % discount.

Coal Screen Iron.

1¾ by ⅝ by 4-16.....3.00c | 1 by ⅝ by 4-16.....3.50

Angle Iron.

2½, 3, 3½ and 4 inch.....3.30
1½, 1¾ 2 and 2½ inch.....3.30
1¼ inch.....3.40
1 " 3.50
¾ " 3.60
½ " 3.80
1½ by 1 inch, for Plow Handles.....3.80
1½ by ⅝ " " " 3.80
1½ by¼ " " " 3.90

T Rail.

8 lbs. to the yard.....2.90 | 20 lbs. to the yard.....2.80
12 " " .....2.80 | 28 " " 2.80
16 " " .....2.80 | 30 " " 2.80

Splice Joints for 12, 16 and 20-lb. Rail, 40c each: 28 and 30 lb. Rail, 50c. each; 40 lb., 60c each.

⅜ by ⅜ and ½ Spikes for 20 and 28-lb. Rail.....3½c
⅜ and ⅜ by ⅜ " " 12 and 16-lb. " 4c
⅝ by ⅝ " " 8-lb. Rail.....4½c

Flat Rails.—Punched and Countersunk.

1¼ to 2 by ¼ to ⅝ inch.....3.00
1¼ by ⅜ and 7-16 inch.....3.20
1¼ by ½, 7-16 and ⅝ inch.....3.40

Juniata Nail Rods.....6.40
Norway " 8.00
Guard Iron ⅞x¼x⅝ and ⅞x⅛x⅝.....4.00
" ⅞x⅜x10-16 and ⅞x⅛x⅜.....4.20
Drag Bars.....3.60
Dropper Bars.....3.80
Cylinder and Landside Iron.....3.20
Plow Beam Iron.....3.00

Nails.

See Pittsburgh Trade Report.

Best Quality Refined Cast Steel.

Square, Flat, Octagon and Round.

⅝ to 2 inches, inclusive.....10½c
1-16 and 2⅛ to 3 inches.....11½c
¼ and 3⅛ to 4 " 12½c
7-32 and 4⅛ to 5 " 13½c
5-16 and 5⅛ to 6 " 16c
5-32 inch.....21c
⅛ inch.....30c
Oil Well Steel Forgings.....20c

Machinery Steel.

	Crucible.	Bessemer & Open Hearth
Ordinary Sizes, ⅝ to 2 inch Round	6c	5c
5-16 and 2⅛ to 3 inches	7c	6c
¼ and 3⅛ to 5 "	8c	7c
7-32 inch	10c	8c
3-16 "	12c	10c

Square, Flat and Octagon, ½c extra throughout the list.

Cut to specified lengths, ½c extra.

Hammer Cast Steel.

Crucible Cast Steel.....7c
Open Hearth Cast Steel.....6c

Sheet Steel.—Crucible.

	Best.	2d Qual.	3d Quat.	Bessemer & Open Hearth.
To 21 gauge.	12c	11c	9c	7c

1c. extra for each additional gauge.

Cut to multiples or specified lengths, ½c. extra.

Miscellaneous Cast Steel.

Auger and Auger Bit.....7c
Axle Steel for carriages and wagons.....7c
Frog Points and Plates.....7c
" Side Bars.....6c
Pick, plain (hammered).....8c
" and Mattock, beveled (rolled).....7c
Skate Steel.....7c
Table Cutlery, plain.....6c
Table Cutlery, beveled.....9c
Pike and Cant Hook.....8c
Coal and Granite Wedge.....8c
Roller.....8c
Spindle, subject to Machinery classification.....8c
Trap Spring Steel.....9c
Forged Crank Pins and Lathe Spindles.....9c
Piston Rods, plain.....7c
" forged to shapes.....9c
Slide Bars, plain.....8c
" forged to shapes.....9c

Crucible, Open Hearth or Bessemer.

Boiler, Fire-Box and Flue Sheets, not less than 5-16 thick.....6c
Boiler, Fire-Box and Flue Sheets, not less than ⅜ thick.....7c
Circulars and semi-circulars, when ordered separately.....8c
Smoke Stack, to shape.....7c
Locomotive Tank Steel.....6c

File Cast Steel.

Square, Round, Half Round and Flat Bastard, 8-inch and over.....8c
Mill Saw, 8-inch and over.....8½c
Taper, 3½-inch and over.....9½c
Horse and Shoe Rasp.....9½c

Spring Cast Steel.

Spira Taper, cut to lengths.....9½c

Tire Cast Steel.

1x¼ and over.....8 4c
1x3-16, ⅝x3-16 and ¼.....9c
1 and 1x10x⅛ and 5-32, ⅝x3-16 and 1-32.....9½c
¾ and ⅝x⅛ and 3-32 and 12 g.....10c
Solid Sate Cast Steel.....21½c
Three and Five Ply Cast Steel.....10c

Agricultural Implement Cast Steel.

Fork and Rake, Crucible.....6c
Horse Rake Steel, cut to lengths, Crucible.....7c
Hoe, Crucible.....6c
Corn Stalk Cutter, beveled.....7½c
Beveled Hoe and Shovel Steel in Bars.....7c
Crucible Plow Steel in slabs.....6c

Bessemer and Open Hearth.

Spring.....4½c
" Spiral and taper, cut to lengths.....5½c
Tire, ⅞ thick and above.....4½c
Toe Calk.....4½c
Plow.....4½c
Axle Billets.....4c
Sleigh Shoe.....4c
Cutter Shoe, cut to lengths and tapered.....5½c
Scythe Back Steel.....4c
Grain Drill Bars.....4c
" Points.....7c
Rolling Coulter Blanks, cut and punched.....9½c
Thrasher Steel.....4½c
" Teeth.....5½c
Rolled Hammer Billets.....4½c

Terms.—Four months; 2 per cent. discount for cash, if remitted within 20 days.

Rolls and Castings.

Furnace Floor and Straightening Plates.....1½c
Housings and Castings not otherwise specified.....2½c
Guide Plates.....3½c
Spindles and coupling boxes.....2½c
Sand rolls and Pinions, large size.....3 c
" small size.....3½c
Pipe Mill Castings.....4 c
Rolling Mill Castings under 50 lbs.....4 c
Spur and Bevel Wheels, large.....4 c
" " small.....4½c
Pulleys up to 30 inches.....4½c
" over 30 inches.....4 c
Engine Castings, light.....4½c
" " heavy.....4 c

Chilled Rolls.

5 to in. diam., to 30 in. long.....4½c
8 to 15 in. " 8 to 40 in. " 4½c
25 to 24 in. " 15 to 72 in. " 4c
14 to 41 in. " 72 to 108 in. " 4c

After Oct. 1, 1881, no discounts will be made at settlement as heretofore, prices quoted being net.

White and Red Lead.

Strictly Pure White Lead in Oil, in kegs, 6½c.; in 25 ℔ Tin Pails, 7c. ₩ ℔ over keg price; 12½ ℔ Tin Pails, 8c ₩ ℔ over keg price; assorted, 1 to 5 ℔ cans, 9c. per ℔ over keg price.

Dry White Lead in barrels.....5½c
Red Lead, very brilliant, in kegs, 6½c; in barrels 6¼c
Litharge (Potter's Lead) " 6½c;
Freights equalized with all points where White Lead is made.

Terms: Note at sixty days, or if paid within 15 days from date of invoice a discount of 2½ per cent. will be allowed, but not otherwise.

Window Glass.

Discount, 70 % on Single Strength, 70 & 10 % on Double.

Single Strength.

Size.	AA.	A	B.	C.
5 x 8 to 10 x 15	$8.25	$7.50	$7.00	$6.50
11 x 14 to 16 x 24	9.25	8.50	8.00	7.25
18x 22 to 20 x 30	10.75	9.75	8.75	7.75
15 x 36 to 24 x 30	12.25	10.75	9.00	8.50
26 x 28 to 24 x 36	13.00	11.50	9.75	9.00
26 x 36 to 26 x 44	14.50	13.25	10.75	9.50
26 x 46 to 30 x 50	15.00	14.00	11.25	10.50
30 x 42 to 30 x 54	16.00	14.50	12.00	
30 x 56 to 34 x 56	17.25	15.50	13.50	
34 x 58 to 34 x 60	18.25	17.25	15.00	
36 x 60 to 40 x 60	20.75	18.75	17.25	

Double Strength.

6 x 8 to 10 x 15	12.75	11.75	10.75	10.00
11 x 14 to 16 x 24	14.50	13.25	12.50	11.25
18 x 22 to 20 x 30	17.25	15.75	14.00	
15 x 36 to 24 x 30	19.75	17.25	14.50	
26 x 28 to 24 x 36	21.00	18.50	15.75	
26 x 36 to 26 x 44	23.25	21.25	17.25	
26 x 46 to 30 x 50	24.00	22.50	18.00	
30 x 42 to 30 x 54	25.75	23.25	19.25	
30 x 56 to 34 x 56	27.75	25.00	21.75	
34 x 58 to 34 x 60	29.25	27.75	24.00	
36 x 60 to 40 x 60	33.25	30.00	27.75	

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length and not making more than 81 united inches, will be charged in the 81 united inches bracket.

Hubbard, Bakewell & Co.'s Goods.

Axes, Single Bit, Lippincott.....Per doz. $8.00
" " James & Co.....7.00
" Double Bit, Lippincott.....14.00
" " James & Co.....12.00
Drain Tools, list.....dis 20%
Hoes, Planters'.....dis 55%
" Scovill Pattern.....dis 55%
" Handled, Square Eye, German.....dis 25%
Handles, Cross Cut.....Per doz. $3.50
" Shovel, Bent, Bored, Riveted..." 2.50
Saws, Circular.....dis 45%
" Long.....dis 40%
" Cross Cut, H. B. & Co., Champion, Per ft. net.....$0 35
" Cross Cut, Lippincott, Champion, Per ft. net.....30
Shovels, list.....dis 20%
Spades, " .....dis 20%
Scoops, " .....dis 20%

BOSTON.

Reported by Macomber, Bigelow & Dowse.

Anvil & Vise.—
No. 1, $5.25; 2, 4.25; 3, 3.50 each.....dis 25 %
Augurs & Bitts.—Snell's Auger.....dis 40&10 %
L'Hommedieu's Ship Auger.....dis 15 %
Jenning's Bitts.....dis 10&10&10 %
Cook's Bitts.....dis 40&10 %
Shepardson's Double-Cut Bitts.....dis 45 %
Shepardson's Double Gimlets.....dis 40 %
Stearn's Extension Hollow Augers—
No. 2, ₱ doz., $48.00; No. 3, ₱ doz., $60.00 list..dis 20 %
Bonney's Extension Hollow Augers.....₱ doz $36.00
Pierce's Bitts.....dis 50 %
Griswold Bitts.....dis 60 %
Axes.—Blue Jackets.....₱ doz $9.00
Red Cross.....₱ doz 8.00
Red Cross Handled.....₱ doz 12.00
Dowse Handled Boys'.....dis 33⅓ %
Ax Handles.—
Oak Extra, 31 in., No. A.....₱ doz $2.50
Oak Extra, 34 in., No. A.....₱ doz 2.50
Oak Extra, 31 in., No. B.....₱ doz 2.00
Oak Extra, 34 in., No. B.....₱ doz 2.00
Oak Extra, 31 or 34 in., No. C.....₱ doz 1.40
Axle Clips......dis 50 %
Balances.—Chatillon's.....dis 33⅓ %
Barn Door Rail.—
Cast Angle (for Anti-Friction Hangers).....₱ ft. 20
Cast Half Round.....₱ ft., ⅝, 3c; ¾, 4c
Wrought Round.....₱ ft., ⅝, 3c; ¾, 4c; ⅞, 5c
Bells.—Connel's Crank Gong, reduced list..dis 15&10 %
Bird Cages.—
Japanned M. B. & D., reduced list, 1879.....dis 40 %
Brass M. B. & D., reduced list 1879.....dis 33⅓ %
Blind Fasts.—Lock Fasts.....₱ C sets $5.00
No. 6 Fasts.....₱ C sets 6.00
Veazie Fasts.....₱ C sets 6.00
Shedd's.....₱ C sets 7.00
Blind Hinges.—Mall, Hook, 3 holes.....₱ C sets 7.00
Brass Awl Handles.—
Phœnix Adjustable.....₱ doz $2.00
Belts.—Norway Iron Carriage.....dis 75 %
Common Iron Carriage.....dis 80 & 10 %
Borax.—Refined.....₱ lb 14c
Boring Machines.—
Eagle Upright each.....$5.50 list } dis 40&10 %
Eagle Angle each.....6.75 list }
Snell Augers.....₱ set $2.45
Braces.—Barber's.....dis 40&5 %
Spofford's.....dis 10&5 %
Backus'.....dis 50&5 %
Bracket Saws.—Holly Scroll Saw.....each $2.25
Demas Lathe and Scroll Saw.....each 6.50
Bracket Saws, extra quality, to No. 5.....₱ gro 0.75
Steel Frame, with patterns.....₱ doz 6.50
Lester.....dis 20 %
New Rogers, all iron.....dis 25 %
Bracket Saw Blades.—Griffith's pat.....₱ gross 7.50
Brackets.—
R. B. & M. Flower Pot, reduced list.....dis 1⅛&10 %
Bronzed Shelf, M. B. & D., new list.....dis 40 %
Store Shelf.....dis 40 %
Butts.—Union Fast Joint.....dis 40&10 %
Union Loose Joint.....dis 40&10 %
Union Japanned Acorn.....dis 50&10 %
Union Silvered Acorn.....dis 60&10 %
Union Boston Finish.....dis 70&10 %
Union Spiral Spring.....dis 25&10 %
Wrought Brass.....dis 60&10%
Carriage Bolts.—Eagle Norway.....dis 70&10 %
Common.....dis 80 & 5 %
Carriage Jacks.—Climax No. 1.....₱ doz $27.00
Climax No. 1½.....₱ doz 15.00
Climax No 2.....₱ doz 13.50
Universal.....dis 25 %
Universal No. 1.....each $2.00
Universal No. 2.....each 3.00
Universal No. 3.....each 6.00
Universal No. 4.....each 6.00
Universal No. 4.....each 6.50
Cartridges.—U. S. Cartridge Co.....dis 70 %
Cards.—
Watson's make Horse & Curry.....dis 10 % } New List,
Watson's Cotton.....dis 10 % } July, 1881.
Watson's Wool.....dis 10 % }
Casters.—Bed and Table.....dis 50 %
Chain.—Traces 6½, 10, 4, straight.....₱ pair 40c
Traces 6½, 10, 4, twisted.....₱ pair 45c
Traces 7, 12, 2, twisted.....₱ pair 80c
Coil 3-16.....₱ lb 10½c
Coil ¼.....₱ lb 8½c
Coil 5-16.....₱ lb 7c
Coil ⅜.....₱ lb 6½c
Coil 7-16.....₱ lb 6c
Coil ½.....₱ lb 5½c
Chalk.—White, Carpenter's.....₱ gross 60c
Red, Carpenter's.....₱ gross 80c
Blue, Carpenter's.....₱ gross $1.00
Chisels.—Hart, Bliven & Mead, Framing..dis 50&10%
Underhill, Framing.....dis 25 %
Buck's Chisels.....dis 30 %
Clothes Line.—
Galvanized Wire, 100 feet each.....₱ doz $4.00
Coal Hods.—"Dover."—Galvanized, New List.dis 50%
Japanned, new list.....dis 50 %
Cocks.—Brass. L. F. & Co.....dis 50 %
Coffee Mills.—New List.....dis 45 %
Copper Rivets......dis 50&10 %
Cordage.—Manila, usual trade dis 10.....₱ lb 14½c
Jute.....₱ lb 8c
Cow Ties......dis 33⅓ %
No. 30, 3 ft. No. 6 Wire, with toggle.....₱ doz $3.80
No. 35, 3 ft. No. 6 Wire, with snap.....₱ doz 4.00
No. 40, 3½ feet No. 6 Wire, with toggle.....₱ doz 4.30
No. 45, 3½ ft. No. 6 Wire, with snap.....₱ doz 4.40
No. 50, 4 ft. No. 4 Wire, with toggle.....₱ doz 4.75
No. 55, 4 ft. No. 4 Wire, with snap.....₱ doz 5.00
No. 60, 4¼ ft. No. 3 Wire, with toggle.....₱ doz 5.80
No. 65, 4¼ ft. No. 3 Wire, with snap.....₱ doz 5.80
Crow Bars.—Cast Steel.....₱ lb 7½c
Iron Steel pointed.....₱ lb 6c
Cutlery.—Pocket American Shear Co.'s.....dis 40 %
Butcher Knives Wood's, Lap Bolster, Square Handle.....dis 30 %
Steak Knives.....dis 25 %
Lap Bolster, Oval Handle.....dis 20 %
Sticking.....dis 20 %
Skinning.....dis 30 %
Butcher, Common Round Handle, Wood's.....dis 20 %
Shoe Knives, Wood's.....dis 20 %
Dividers.—Cook's.....dis 20 %
Dog Collars......dis 20 %
Door Springs.—Torrey's Rod.....₱ doz $1.62
Imitation Torrey's Rod.....₱ doz 1.40
Gem Coil, new list.....dis 50 & 10 %
Crown.....₱ doz 1.25
Warner's.....₱ doz 2.00
Door Stops.—Thurston's.....dis 50 %
Drawer Knobs.—Thurston's.....dis 50 %
Drills.—Morse Bitt Stock.....dis 25 %
Morse Straight Shank.....dis 20 %
Emery.—Wellington Mills.....₱ lb 15c
Walpole Emery Mills.....₱ lb 9c
Turkish in 10 lb cans.....₱ lb 8c
Enameled Ware.—
Standard Mfg. Co. Kettles.....dis 40 & 10 %
Standard Sauce Pans.....dis 40 %
Felloe Plates.—Wrought.....₱ lb
Files.—American File Co.....dis 45 %
Nicholson File Co.....dis 45 %
Fluting Machines.—Knox list, $4.00.....dis 20 %
American list, $4.40.....dis 20 %
Forks.—W. C. & Co. Manure.....dis 40 %
Gimlet Bits.—
Genuine German, No. 125, 1-32 to 8-32, per doz $1.00
Pierce's.....per doz .50
Glass Cutters.—Combination Glass Cutter and Knife Sharpener.....₱ doz $1.00
Grub Hoes.—K. P. & Co.'s No. 2, $11.50 ₱ doz.dis 40 %
Hammers.—Maydole's.....dis 15 %
Eartford Hammer Co.....dis 20 %
Hangers & Rollers.—Anti-Friction.....dis 40 %
Acme Rollers.....dis 40 %
Climax.....dis 40 %
Common Hangers.....dis 40 %
Common Rollers.....dis 40 %
Hand Screws......dis 10 %
Hatchets.—C. F. Dowse new list.....dis 33⅓ %
Underhill.....dis 30 %
Hay Knives.—Lightning.....₱ doz. $18.00, net
Fisher's Patent.....₱ doz $14.00
Hinges.—Strap and T (new list).....dis 60 %
Providence Plate.....₱ lb 25 %
Wrought Screw Hook.....₱ lb 25 %
Hoes.—W. C. & Co.'s.....dis 40 %
Hooks and Staples.—Brewers' (new list).....dis 60
Horse Nails...... No. 6 7 8 9
National Finished.... .23 .21 .20 .19....dis 20 %
Putnam Pointed..... .24 .22 .21 .20.....5 %
Bridgewater..... .21 .19 .18 .17.....list
Ice Cream Freezers.—Packer's, new list.....dis 40 %
Knobs.—"Norwalk." New list.....dis 40 %
Silver Glass.....dis 60&10 %
Silver Glass Bell Pulls.....dis 60&10 %
Lanterns.—Tubulars, No. 0.....₱ doz 8.00
Lawn Mowers.—The "Daisy."
12 in. cut.....each, $8.00
14 in. cut.....each 8.50
16 in. cut.....each 9.00
18 in. cut.....each 9.50
Lead.—Sheet.....₱ lb 7½c
Pipe.....₱ lb 8½c
Locks.—Norwalk.....dis 40 %
Eagle Cabinet.....dis 25 %
Eagle Trunk.....dis 15 %
W. Wilcox & Co., Padlocks.....dis 30 %
Manure Forks.—W. C. & Co.....dis 40 %
Mattocks.—
K. P. & Co., Long Cutter, $16.00 ₱ doz.....dis 40 %
K. P. & Co., Short Cutter, $15.50 ₱ doz.....dis 40 %
K. P. & Co., Pick Cutter, $16.00 ₱ doz.....dis 40 %
Measuring Tapes.—Eddy's.....dis 20 %
Meat Cutters.—Miles' Challenge.....dis 30 %
Hale's, (new list).....dis 40 & 10 %
American.....dis 25 %
Money Drawers.—Tucker's Am.....₱ doz $22.50
Mouse Traps.—Delusion.....₱ doz 1.40
Novelty.....₱ doz
Nails......₱ keg 3.00
Oilers.—Zinc and Tin.....dis 50 %
Brass and Copper.....dis 40 %
Ox Bows.—Extra finished and varnished.....dis 10 %
1¼ in., ₱ doz. pair...$7.00 | 2 in., ₱ doz. pair, $10.00
1½ in., ₱ doz. pair... 9.00 | 2½ in., ₱ doz. pair . 12.00
Paper.—Tarred Sheathing.....₱ lb 2½c
Tarred Eagle Brand.....₱ lb 2½c
Picks.—K. P. & Co., Adze Eye, 5 to 6 lb $12.00.....dis 40 %
K. P. & Co., Adze Eye, 6 to 7 lb $13.00.....dis 40 %
Planes.—
Fancy Planes.....dis 15 %
Razee Planes.....dis 20 %
N. Y. Tool Co.....dis 20 %
English Iron.....dis 20 %
Bailey's.....dis 20&10 %
Plated Ware.—Rogers & Bro.....dis 40&5 %
Pliers.—Vom Cleff & Co.'s.....net list
Button's Wire Pliers.....dis 33⅓ %
Plumb & Levels.—Stanley R. & L. Co ...dis 60&10 %
Pocket Knives.—American Shear Co.'s.....dis 40 %
Potato Diggers.—W. C. & Co., reduced list..dis 40 %
Pulleys.—Acme or Excelsior, 1¾ in.....₱ doz 24c
Acme or Excelsior, 2 in.....₱ doz 27c
Pulley Blocks......dis 35 %
Pumps.—Union Manufacturing Co.
Iron Cistern.....dis 40 %
Iron Pitcher Spout.....dis 40 %
Copper.....dis 30 %
Rivets.—Black (new list).....dis 40 %
Carriage in 10 lb papers (new list).....dis 40 %
Copper.....dis 33⅓ %
Razors.—Torrey's.....dis 30 %
Razor Straps.—Torrey's.....Full line
Rules.—Stanley, Boxwood.....dis 70 &10 %
Stanley, Ivory.....dis 55&10 %
Sad Irons.—Common.....₱ lb 5½c
Laundry.....₱ lb 6½c
Tailors' Geese.....₱ lb 6 c
Enterprise, "Potts'".....dis 35 %
Sash Locks.—King & Hutchinson's, new list.dis 40 %
Sandpaper.—Baeder & Adamson.....dis 30 %
M. B. & D.....dis 33⅓ %
Sash Weights.—Patent Eye.....₱ lb 1½c
Saws.—Hand Saws, Disston's.....dis 20 %
Wheeler & Clemson.....dis 20 %
Cross-Cut Saws.
W. M. & Co., Common Tooth, No. 1.....₱ foot 10c
W. M. & Co., Champion Tooth.....₱ foot 10c
Disston's, Common Tooth.....₱ foot 68c dis 40 %
Disston's Great American Tooth...₱ foot 68c dis 40 %
Boynton's Lightning Tooth.....₱ foot 45c
M. B. & D., Hand Saws.....dis 33⅓ %
W. M. & Co.'s Circular Saws.....dis 35 %
Richardson Bros.....dis 25 %
Saw Blades.—Disston.....dis 20 %
W. M. & C.....dis 10 %
Welch & Griffith, Extra.....₱ doz $8.40
Welch & Griffith, No. 2.....₱ doz 7.00
Scales.—Fairbanks.....dis 20 %
Screws.
American Flat-Head Iron.....new list, dis 55 & 5 %
American Flat-Head Brass.....new list, dis 55 & 5 %
American Round-Head Brass....new list, dis 55 & 5 %
American Round-Head Iron....new list, dis 50 & 5 %
Grilley Round Head Nickel-Plated Common..dis 40 %
Scythes.—Clippers, in boxes.....₱ doz $6.75
Shaves.—Kimball's.....₱ inch 75c
Watrous.....dis 15 %
Shears.—American Shear Co., new list.....dis 70 %
Shot.—Tatham's.....₱ lb 7c
Shovels.—O. Ames, new list.....dis 15 %
O. Ames, other brands, new list.....dis 15 %
M. B. & D.....dis 15 %
Sinks.—Magee Patent.....dis 30 %
Snow Shovels......$4.00
Skates.—Union.....dis 25 %
Acme.....dis 25 %
Imperial Club list No. 5, $3.75 ₱ pair list No. 7, $4.00 ₱ pair.....dis 25%
Stocks and Dies.—King's.....dis 10&5 %
Tacks.
Swedes Tinned.....dis 30&10 %
Swedes Iron.....dis 30 & 10 %
Gimp and Lace.....dis 20 & 10 %
Copper Tacks.....dis 30 & 10 %
All balances on list.....dis 20&10 %
Traps.—Oneida, Genuine.....dis 33⅓ %
Oneida, Imitation, H. & N.....dis 40&10 %
Blake's.....dis 40&10 %
Vises.—Simpson's Adjustable.....dis 25&5 %
Howard Vise Co.....dis 25 %
Prentiss'.....dis 20 %
Weather Strips.—Packer's.....₱ doz $4.50
Browne's Flexible Rubber.....dis 30 %
In 25 feet boxes: No. 1, ⅛ in. wide, ₱ yard, 10c.; No. 2, ⅜ in., 15c.; No. 3, ⅝ in., 20c.; No. 4, 1 in., 25c
Black Walnut Spring Weather Strips.....₱ doz $1.50
Window Springs......dis 40 %
Babcock's No. 3.....₱ gross $0.25
Babcock's No. 4.....₱ gross 4.75
Wire Cloth.—"Clinton".....₱ ft.
Wire Fence.—Scutt's Patent, Painted.....₱ lb 7½c
Scutt's Patent, Galvanized.....₱ lb 7½c
Wire Goods.—Gate Hooks and Eyes, &c., dis 70&10 %
Wrenches.—A. G. Coe's.....dis 50 %
Girard Mfg. Co.....dis 60 & 10 %
Girard Agt.....dis 60 & 10 %
Wringers.—
Novelty No 2 for Common Tubs.....₱ doz 42.00
Novelty " 3 " " " .....₱ doz
Excelsior E " Stationary Tubs.....₱ doz
Excelsior F " " " .....₱ doz 45.00
Excelsior A with Folding Bench.....₱ doz 55.00
Excelsior B " " " .....₱ doz 65.00
Novelty Set Tub, E.....₱ doz 40.00
Keystone, Wood Frame No 1¾.....₱ doz 30.00
Keystone, Iron Frame No 2¾.....₱ doz 37.50
Zinc......₱ lb 6½c

McNab & Harlin Mfg. Co.,

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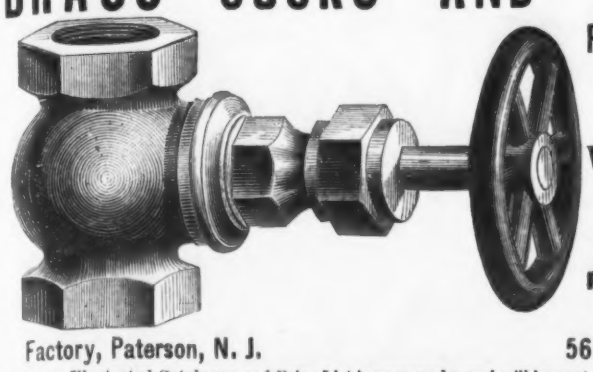
BRASS COCKS AND VALVES,



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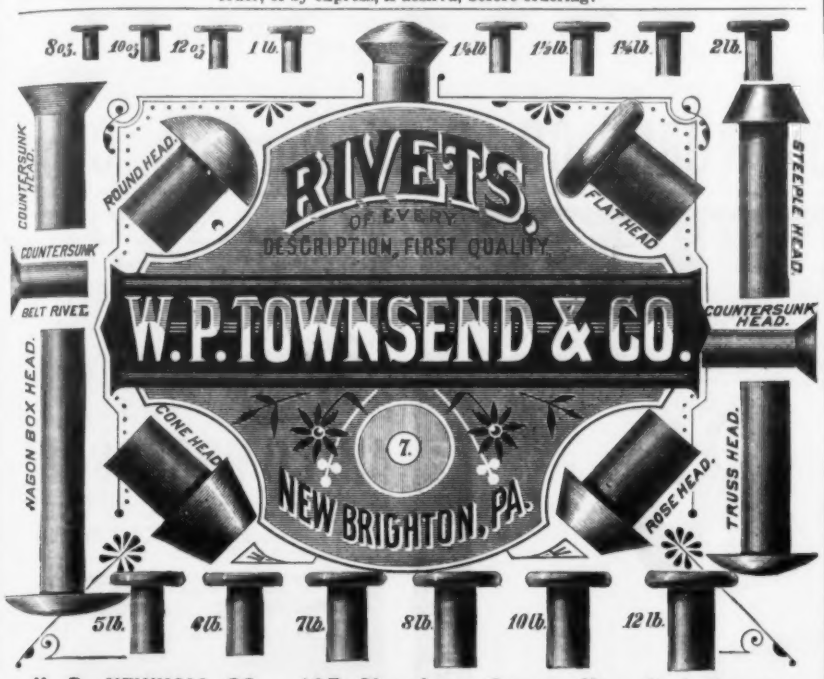

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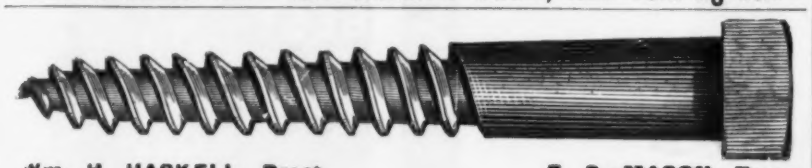

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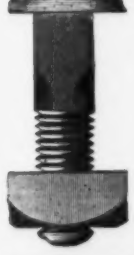
ALL KINDS OF

Machine and Plow Bolts,

AND

TAP BOLTS.



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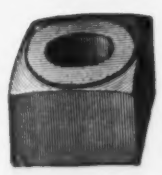

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Philadelphia "STAR" Bolt Works.

NORWAY IRON FANCY HEAD BOLTS,

Carriage & Tire Bolts. Star Axle Clips, &c.

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G. W. Bradley's Edge Tools.

Butchers' Cleavers.
Butchers' Choppers,
Axes and Hatchets,
Grub Hoes and Mattocks,
Mill Picks,
Box Chisels and Scrapers,
Ring Bush Hooks,
Ax Eye Bush Hooks,
Socket Bush Hooks,
Watt's Ship Carpenters' Tools,
Carpenters' Drawing Knives,
Coopers' and Turpentine Tools.

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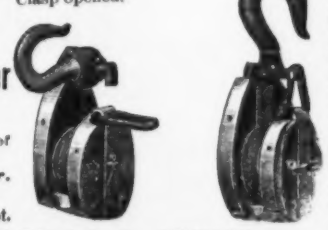

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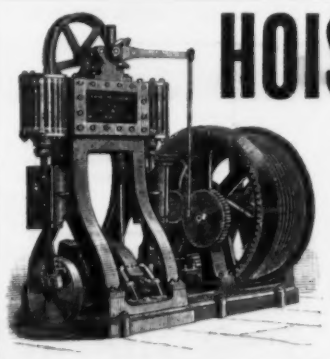

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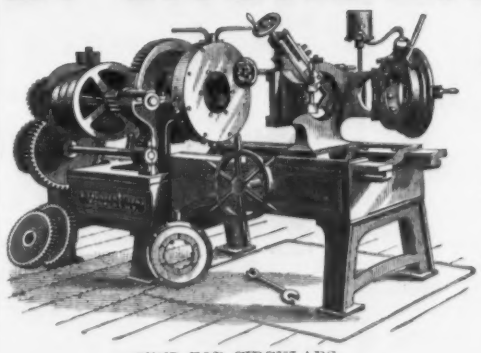

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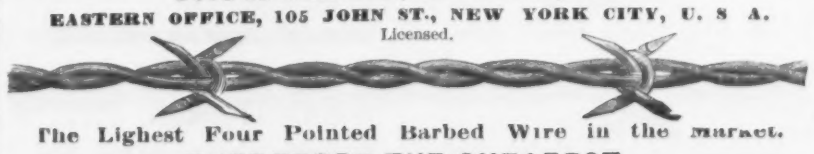

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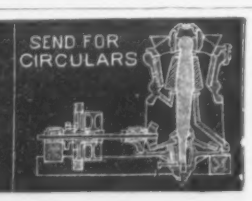

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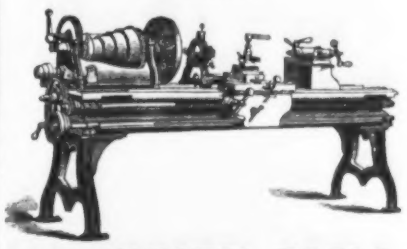

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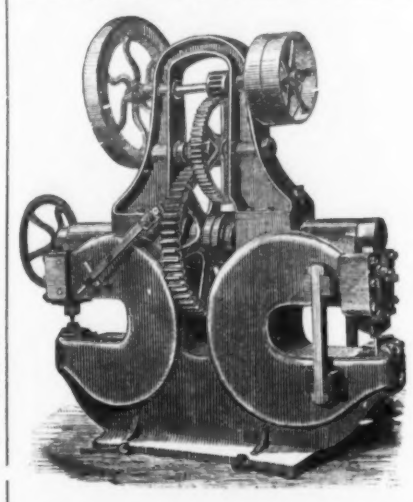

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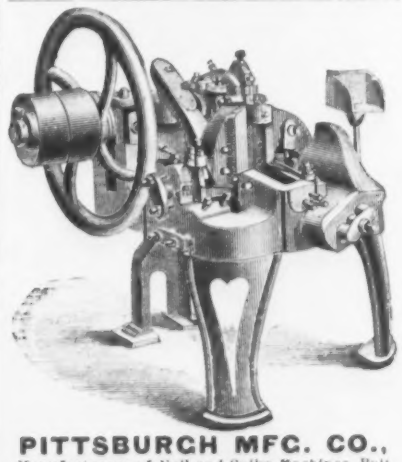

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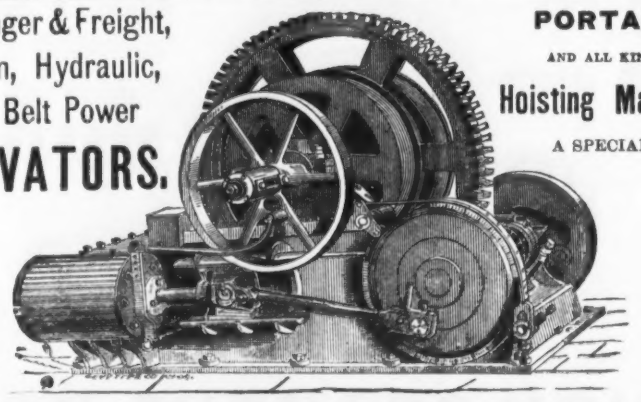

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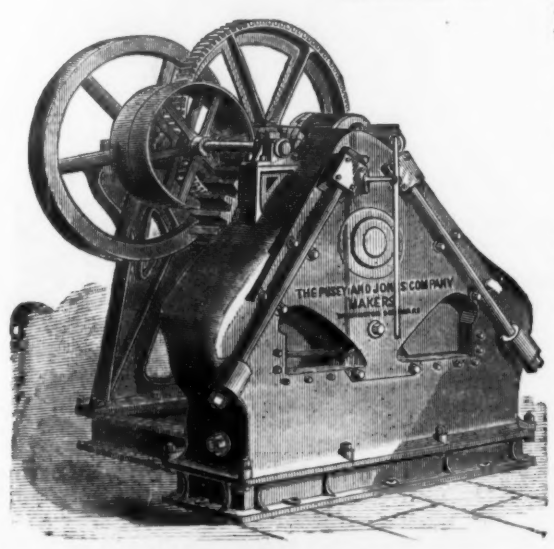

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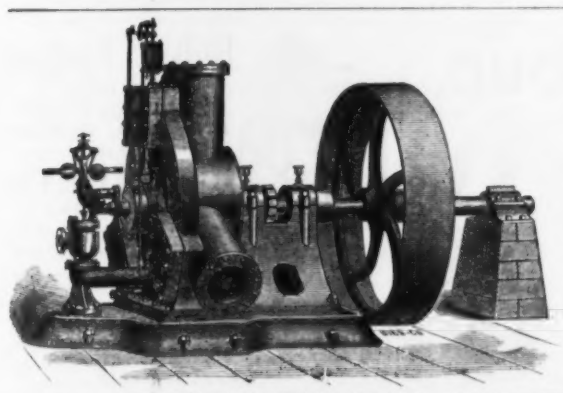

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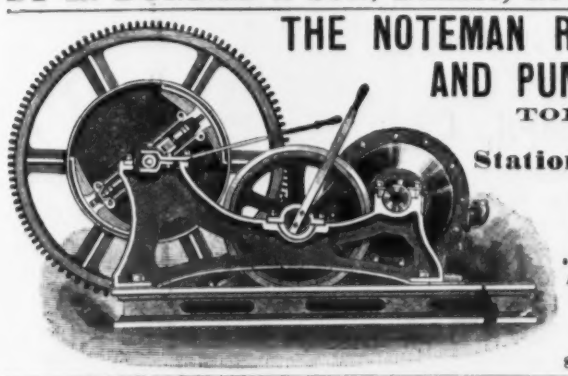

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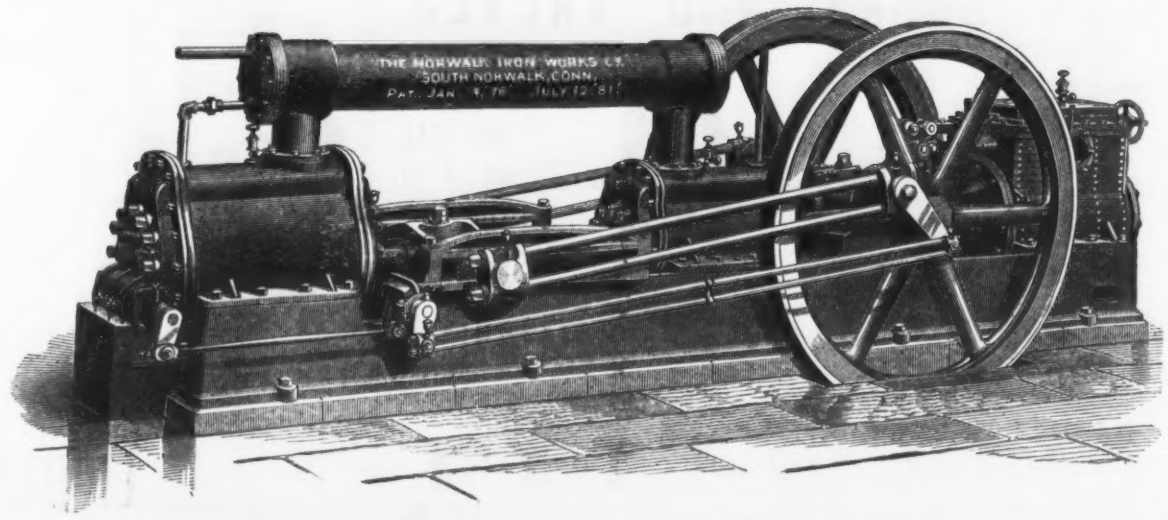

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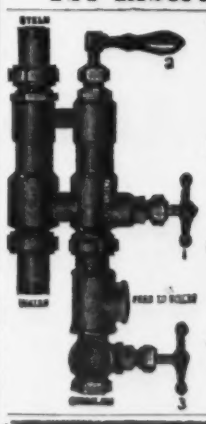

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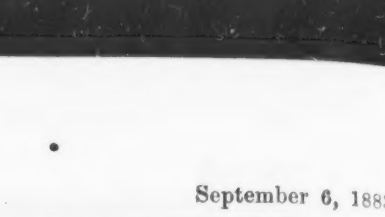

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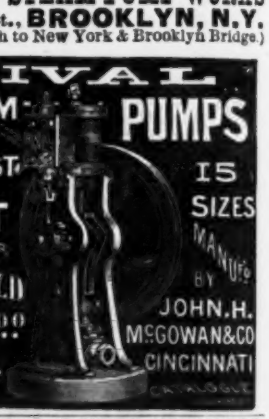

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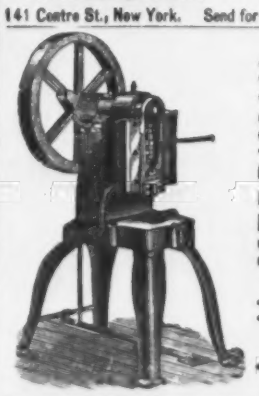

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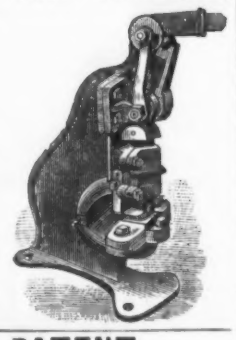

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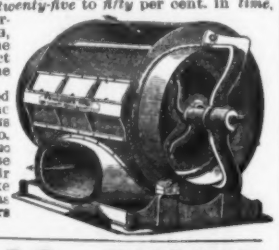

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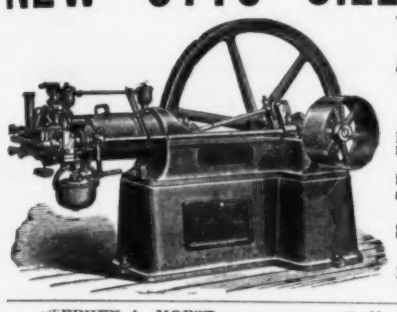

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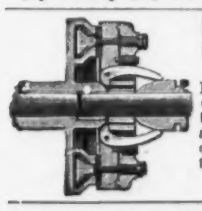

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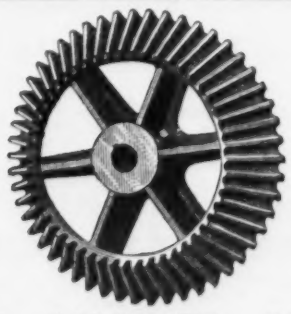

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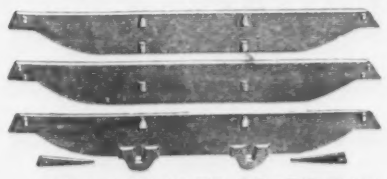

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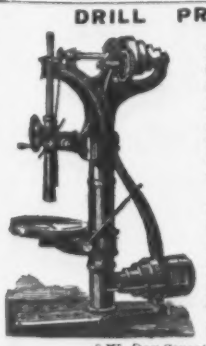

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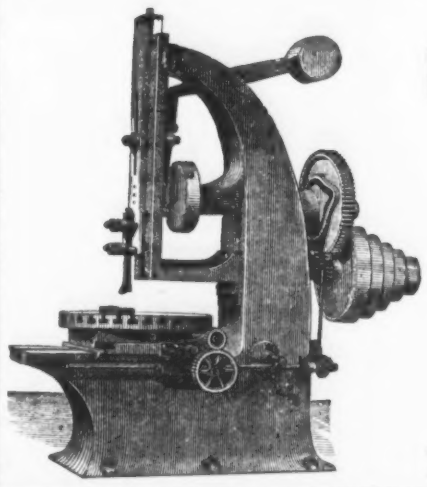

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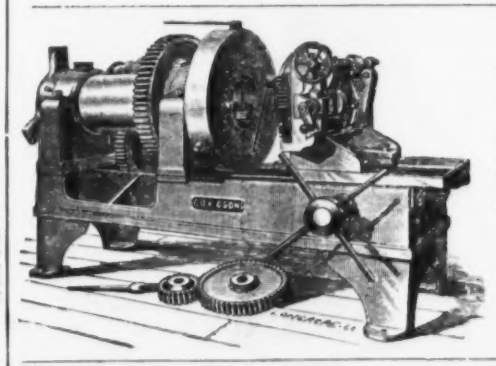

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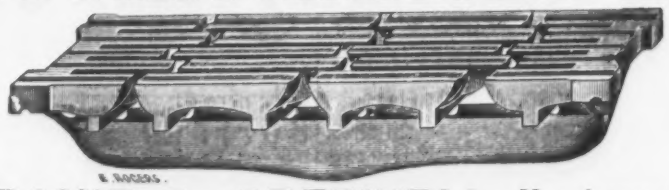

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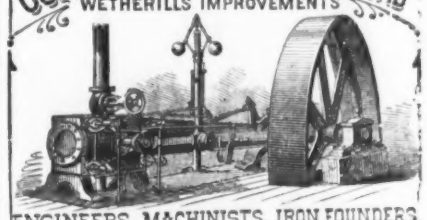

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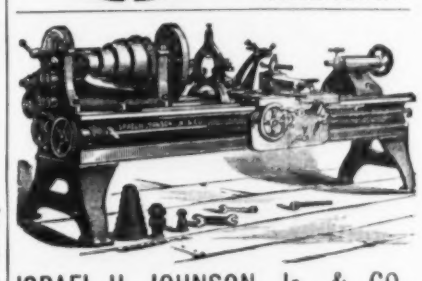

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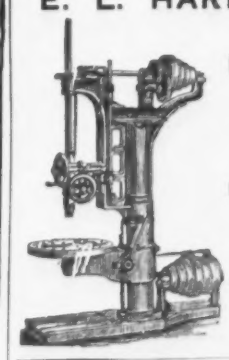

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